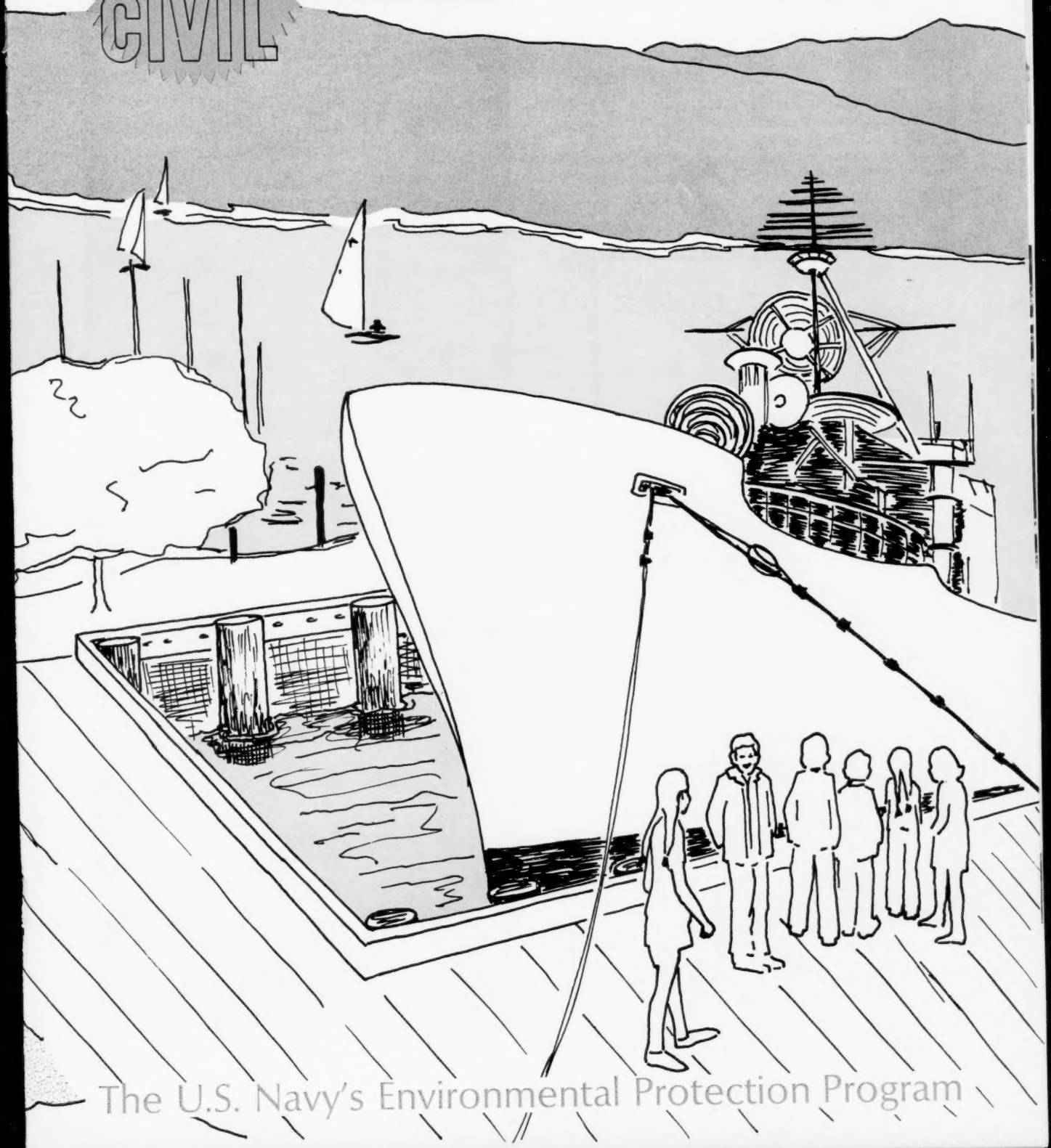
NAVY CIVIL ENGINEER

SUMMER 1974



The U.S. Navy's Environmental Protection Program

The editorial offices of The Navy Civil Engineer have been relocated to the campus of the Naval School, Civil Engineer Corps Officers (CECOS).

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ON THE COVER — The Navy's widespread concern for environmental matters and its corrective action is portrayed by Artist Barbara Gray, CECOS, whose talents are welcomed back to the pages of *The Navy Civil Engineer* as well as the highly unique technique of John Roth, (page 12) of Southern Division, NAVFAC.

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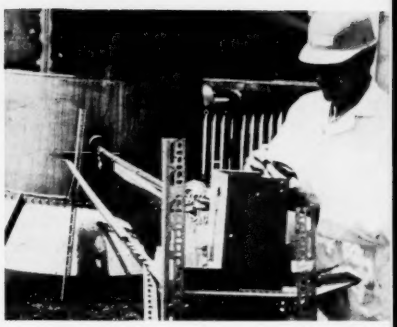


AIR QUALITY — A technician of the Navy source emission test team measures a chimney's atmospheric discharge.

WATER CONTROL — The Navy's waste water is regularly monitored to prevent discharge of pollutants into streams and shores.

NOISE SUPPRESSION — Jet aircraft roar is measured to aid in the design of preventive devices and techniques for better sound control.

• Port Hueneme, Calif.

The Navy Environmental Support Office (NESO), formerly attached to the Civil Engineering Laboratory (CEL), has been transferred to the Naval Construction Battalion Center, as a staff office.

The move separates NESO from CEL but the 44-man organization will remain with the laboratory and adjacent facilities for the present, according to LCDR W.P. McTomney, CEC, USN, NESO director.

He explained the change is in accordance to a master plan developed during a two-year research and development program while at CEL. Now an operating function, the office has concluded administrative and organizational ties with the laboratory.

NESO is deputy program manager for the Naval Environmental Protection Support Service (NEPSS), the Navy's single central information center under the Naval Facilities Engineering Command (NAVFAC).

NESO is the central coordination office for the Navy-wide system. It provides planning and identification. It reviews and recommends, programs, projects and budgets for the NEPSS to NAVFAC headquarters. NESO also establishes and maintains specifications for uniform environmental monitoring throughout the Navy and develops standard operating procedures for consistency in operations for the collection of environmental data.

the navy's environm office

By LCDR WILLIAM P. McTOMNEY, CEC, USN
Director, Navy Environmental Support Office

• Port Hueneme, Calif.

Quietly, but effectively, the Naval Environmental Protection Support Service has been strengthening its role as the Navy's single central environmental information program.

Developed by the then Navy Civil Engineering Laboratory, NEPSS became formally operational on 1 July 1973 with the responsibility to "identify and quantify Navy sources of pollution". The mission of the service was to establish a baseline of environmental data for use by Navy decision makers and to emphasize Navy compliance with the myriad of federal, state, and local environmental regulations.

As the central information source to support the Navy's extensive environmental protection and enhancement program, NEPSS is now actively supporting commanding officers, system commands, area commandants and major claimants in meeting environmental responsibilities and goals.

The Federal Water Pollution Control Act (FWPCA) amended in 1970, provided the impetus to first develop a wastewater monitoring program and then to collect samples in the field at various discharge points. This program was underway at approximately 20 Naval activities by July of 1973. The collected water samples are being sent to Navy or commercial laboratories for analysis. The results are sent to the central office of the NEPSS located at NCBC, Port Hueneme. This numerical data is put in automated files and a report sent to the cognizant commanding officer showing specific quantities and concentrations of constituents and comparing them against acceptable legal limits.

With such information, the commanding officer can readily identify whether or not a particular wastewater producing process is in violation; and based upon the amounts and characteristics shown, he can select from a number of alternatives to rectify the problem. Not only can he modify or eliminate the process to ensure compliance with the applicable standard, but an abatement facility could also be programmed.

The information on file at the NEPSS is used to complete the required quarterly reports for the national pollutant discharge elimination system (NPDES) permits issued by Environmental Protection Agency (EPA) to the activity. This significant obligation requires commanding officers to obtain a permit from the regional EPA office prior to discharging pollutants into navigable waters, and EPA commenced issuing these permits in January.

ISSUANCE OF PERMITS

Under the law, through NEPSS, the Navy applied for 310 permits in April of 1973 and to date nearly 100 permits in either the draft or final stage have been issued. By January 1975 all 200 estimated final permits will be in effect and extensive monitoring programs will be underway at Naval activities.

Personnel in the NEPSS have been performing the detailed negotiations with the EPA offices prior to issuance of the permits to ensure only minimum amounts of data are collected and that reasonable conditions exist on the permits. In addition to relieving the commanding officer of the burden to obtain valid permits, the NEPSS through the wastewater monitoring program, has identified the laboratories for sample analysis, procured required equipment to monitor and sample, and trained sample collection personnel.

This is being accomplished centrally through the NEPSS to ensure uniformity in meeting regulatory requirements at all Naval activities in a cost-effective manner. After the monitoring program is established at the activity and is underway satisfactorily, the commanding officer through normal operational funding channels will provide the resources for continued monitoring under the permit. The personnel at NEPSS will continue however, to provide

nental support

the required quarterly reports and be available, upon request, to assist if monitoring problems develop.

The data collected under the wastewater monitoring program not only enables the Navy to ensure compliance with the permit and other requirements but it establishes a baseline of the water quality at the activity; indicates the Navy's impact on the surrounding community; and provides credible design data for planning costly abatement facilities.

AIR EMISSION TESTS

Although water is the primary media for expenditure of resources, the watewater monitoring program is only one of the areas where the support service is providing assistance in a positive manner. Through the NEPSS specialty teams, comprised of personnel with equipments and expertise not normally found at a Naval activity, the Navy has in-house personnel to respond rapidly to commanding officers' environmental problems and provide on-site assistance.

The air source emission test team (see the Navy Civil Engineer, March 1970) has been to a number of Naval facilities and will continue to provide the source emissions test on boiler stacks under the Navy's boiler tune-up program. This information coupled with the optimum performance setting on the boiler controls ensures Navy boilers are operated efficiently and in compliance with state and local air standards. Compatibility with energy conservation gives the BTU program added luster, and an estimated annual savings of 6.5 million gallons of fuel oil was identified at the first 12 activities where this program was completed.

The air test teams have also been busy sampling other type sources and are available to test stacks for compliance with local regulations or to check operations of the abatement equipments installed.

Fully scheduled through fiscal years 1974 and 1975, the teams will be made available for emergencies and upon special requests. Again, the resources to support these specialty teams are provided through the NEPSS, and the central management ensures uniformity in methods for this EPA-certified air emission test capability.

There are other teams and services being provided and available thru the NEPSS as it continues to fulfill its intended role. Noise specialty teams provide assistance on aircraft or community noise problems upon request, and they are now performing noise measurements in support of land use planning and Air Installation Compatibility Use Zones (AICUZ) studies.

Specialists from the land/water team are available to assist with environmental problems such as those recently completed at a sanitary landfill site in Florida or a water reclamation problem in the Caribbean.

Summaries of accidental and operational oil spills are provided through the NEPSS to Navy planners at all levels; the Navy's pollution control reports to the office of management and budget are coordinated and produced through the NEPSS; and an environmental library and central legal file for federal, state, and local regulations are available for local commands' use. Numerous queries have been received on a variety of environmentally-related problems from a number of activities, and satisfactory replies have been made.

Aircraft and ship-related environmental problems are addressed in this Navy-wide program, and development of emission factors for all ship wastes and aircraft air and noise problems is in progress.

The information obtained through NEPSS supports in various ways all Navy environmental-related programs including the energy program, national pollutant discharge elimination system (NPDES), boiler tune-up (BTU) air installation compatibility use zones (AICUZ), ship waste off loading system/collect hold transfer system (SWOLS/CHT), and the environmental impact assessment/environmental impact statements (EIA/EIS).

As the Navy's single centrally managed, regionally operated environmental information source, NEPSS is proving itself effective in the intended cost-effective manner.

Why the Navy is doing all of this is contained in the direction of presidential executive orders and other federal legislation in addition to the Navy's desires to do its share in protecting the environment for future generations.

How it performs is through expertise represented in the NEPSS. The environmental scientist/engineers and programs at the Navy Environmental Support Office (NESO) perform the function of deputy program manager, responsible for central management of the program. Regional operation is provided through the six NAVFAC engineering field division (RESOs) environmental quality branch personnel, for shore facilities problems.

NAVY LEADERSHIP

NAVSHIP representatives (SESO) at the Naval Ship Research and Development Center (NSRDC), is responsible for data collection on ship related problems and the NAVAIR representative (AESO) at the Naval Air Rework Facility, North Island, San Diego, Calif. for aircraft related air and noise problems. The assistant commander for operations and maintenance at NAVFAC has responsibility as program manager under the Chief of Naval Material who is responsible for the Navy's overall Environmental Quality Program.

Although it appears complex and mysterious because it's relatively new with a new name and acronyms to learn, it is effective and providing the personnel and resources to assist in local environmental problems. The NEPSS helps ensure that the Navy continues to do its part, in fact to lead, in the nation's goal to obtain clean air, clean water and clean land.

USUHS . . .

By ROSEMARY ANDRE,
Community Planner
Master Planning Branch, NAVFAC

The Uniformed Services University of Health Sciences

• Alexandria, Va.

The new Uniformed Services University of the Health Sciences (USUHS) will be located on the present site of the National Naval Medical Center (NNMC) in Bethesda, Md. Established by the Uniformed Services Health Professions Revitalization Act of 1972, USUHS will provide health sciences education to commissioned officers of the uniformed services.

Students are to attend the university in the rank of ensign or second lieutenant with full pay and allowances. A minimum of 100 students are to graduate annually from the new university, with the first class scheduled to graduate in 1982. Upon graduation, students will have a seven year active duty service obligation, however not more than 20% of any graduating class may satisfy the obligation by performing a non-military service option.

The President has appointed a nine member civilian board of regents by and with the advice and consent of the Senate. The Secretary of Defense (or his designee), the Surgeons General of the Uniformed Services and the Dean of the University will serve as ex officio members of the Board.

The Secretary of Defense has approved Bethesda as the site for the USUHS and designated the Navy as the executive agent for the university.

The Naval Facilities Engineering Command (NAVFAC) subsequently was designated construction agent for the university.

An initial planning analysis was undertaken by the NAVFAC installations and facilities planning group. The developmental portion of this study, which consisted of defining objectives, data gathering, vicinity and site analyses, concept development and plan formulation, were accomplished within a three week period. By the time of the first presentation, an architectural working model of the first of four alternatives had been constructed, which enabled presentation participants to better envision topography, construction, and urban design constraints. For subsequent presentations, a model was constructed of alternative plan two, for equivalent comparison of the two plans considered to have the most potential.

The NAVFAC study effectively tested the feasibility of locating the necessary USUHS facilities on the wooded, hilly Bethesda site, with positive results.

The location is occupied with hospital and tenant facilities that cover approximately a third of the property, including a 700 foot setback from Wisconsin avenue. This leaves approximately 95 acres of land most feasible for development, determined by an analysis technique of overlaying the mapped variables of soil types, topography, ground cover, current development, stream beds, and flood plains.

A stream cuts through the property, draining into Rock Creek nearby. Study parameters included restriction of development from areas within the 100 year flood plain, and on slopes greater than 15%.

The ultimate development of the complex may reach 2.7 million square feet for the new university, and 1.25 million square feet for the Naval hospital reconstruction, to reach approximately 4 million square feet of new construction on the site.

Certain restraints became evident as the study progressed. For instance, the university's requirements are highly sensitive to the curriculum and the teaching methodology. The faculty and students require support at teaching hospitals as the mandate for clinical teaching is that each student be assigned from four to eight hospital beds. Besides the Naval hospital available for training on the Bethesda site, other area hospitals that would offer training support would include Walter Reed Army Medical Center and Malcolm Grow Composite Medical Center at Andrews AFB. Also, the National Institutes of Health and the National Library of Medicine will be resources of aid to the new university. Special teaching requirements for both the university and at the support hospitals will require further study.

Community limitations such as zoning, planning and density controls were studied and were in general conformity with the site development plan.

The site is located in a medical/residential area and is zoned for institutional use. However, Montgomery County (Maryland) has a no-growth policy, which is reflected in the current sewer moratorium.

This moratorium will necessitate a feasibility analysis of locating a package sewage treatment plant on the site in the event a waiver of the moratorium cannot be obtained.

The recent impounding of Federal funding for clean water programs further complicates the problem.

The site favored integration of parking structures into the buildings because of the minimal buildable land. The study asumed maximum development, including locating housing on-site for all students, though this decision has not yet been made.

Thus, student housing was considered from both points of view of locating all student housing (including family housing) on-site, and of limiting on site housing to that of bachelor student units.

If both types of housing are provided, more flexibility could be provided with convertible multi-purpose units usable for either bachelor or family living, and allow study space for the medical students. However, it may be necessary to obtain special legislation in order to provide funding for multiple-use student housing.

If initial funding is not provided for maximum development of the entire hospital/university complex, the resultant "staged development" process could have design and cost impact.

It appears also that there will be an immediate need for an interim surge facility, for both location of administrative offices and for classroom space. The complex has been designed to allow the operation of the Naval hospital during construction.

It was not the intent that this study represent a completed process, but only one step in the necessary evolution of the hospital/university complex development.

The next steps in the planning process will be preparation of a master plan and a space program for the university and concept plans for the hospital. The NAVFAC planning study has pinpointed problem areas and furnished background data to the architect-engineer for recommended solutions.

architectural designs for the handicapped

By EDWARD RIDEL, R.A.
Chesapeake Division, NAVFAC

• Washington, D.C.

If one can open a door, use a public telephone, or use a public toilet, he seldom gives a second thought to such everyday occurences. But what if one could not use these facilities or many others? What if the telephone were placed in a location he could not reach, or the landing of a stair was so narrow that he could not open the door? These are obstacles that the handicapped face every day. Who puts these extra burdens on those already restricted by life? As architects and engineers, we do. We shape the environment that people, including handicapped individuals, use daily.

How many of us have used our positions to insure that handicapped veterans, dependents, or employees, who use the buildings we provide, can in fact use them? This means not only the clinics or hospitals where it is obvious that the handicapped will use the buildings, but also office buildings, research facilities, personnel support facilities and housing. It is true that active duty personnel will not likely be permanently handicapped, but no such assumption can be applied to dependents, veterans, retired personnel and the civilian personnel who must use these facilities. Nor can we forget that even active duty personnel can be temporarily disabled through injury.

Our instructions in this regard are quite explicit. They state:

> "Military structures such as air terminals, chapels, administrative facilities and theaters likely to be used by the physically handicapped shall, therefore, be designed in accordance with the provisions of the latest edition of the American National Standards Institute (ANSI) A117.1 to facilitate access. Normally, such compliance is not mandatory for barracks, BOQ's, family housing, hazardous activities, and facilities in remote and inaccessible locations. However, many of the handicapped-type access features are worthy of consideration for incorporation in most types of structures and should be included where feasible."

NAVFAC criteria in DM-1 are similar in nature and direct us to the ANSI standard. The basic design criteria contained in the ANSI standards are for site development and for buildings. While the primary emphasis is on architectural details, it is imperative that all architects and engineers become aware of, and responsive to, the design criteria.

The site development section includes standards for grading, walks and parking lots. These standards consist of minimum dimensions and recommendations for accessibility of parking to the handicapped. The buildings section is quite comprehensive and covers the following topics:

- ramps — gradients, handrails, surfaces
- entrances — accessibility
- doors and doorways — dimensions, landings, door openers
- stairs — details, handrails
- floors — surfaces
- toilet rooms — dimensions, detailing
- water fountains — accessibility
- public telephones — accessibility
- elevators — accessibility
- controls — location
- identification — sympathetic to the blind
- warning signals — visual and audible
- hazards — lighting, manholes

Hopefully, all of us will awaken to our design responsibility in the area of the human needs of those who are handicapped. Design must fulfill the required needs of the user. It is up to us to realize that the user may be handicapped.

REST ROOMS should include at least one lavatory placed at wheelchair height.

AN INCLINE from a parking area eases wheelchair access to building entrance.

The Case Of The

Mercury Tainted Waters

Drinking Supply Endangered Until Navy Lab Sleuths Discovered The Source

By BADI I. AZAR
Utilities Division
Atlantic Division, NAVFAC

• Norfolk Va.

A startling discovery was made in March 1973, that the potable water supply of the U. S. Naval Air Station Annex, located six miles west of Hamilton, Bermuda, contained mercury in high concentrations.

First measurements revealed that the drinking water contained mercury contaminents of 60 to 80 parts per billion (ppb) — which was 12 to 16 times higher than the maximum allowable limit of 5 ppb permitted by Navy medical authorities.

Where did the mercury come from?

It was believed that it came from paints used in four recently coated rainwater catchment areas. The paint was a polyvinyl acetate emulsion exterior paint. Immediately, the Atlantic Division (LANTDIV) went to work to determine what mercury additive, if any, the paint possessed. The specification section, the original special project request, and the military specification for this type of paint indicated no harmful additives.

However, consultation with the Civil Engineering Laboratory (CEL) confirmed that the subject paint was known to contain mercury compounds added for fungus and mildew resistance of the applied coating. When such paint comes in contact with water, the mercury leaches out and contaminates the water, creating a potentially serious health hazard.

The Environmental Branch of Atlantic Division established procedures to determine the extent of mercury contamination, isolated the contaminated water from human consumption, and insured a temporary alternate source of potable water. All the technical assistance provided was coordinated with Navy Bureau of Medicine personnel.

A special field test kit for detecting the mercury was procured and air shipped to Bermuda. The author, a sanitary engineer, arrived at the same time to evaluate the extent of contamination, provide problem analysis, collect and analyze water samples, and assist in the decontamination procedures.

Action was taken to further isolate the problem area and to utilize mercury-free water until the Annex water supplies could be properly treated and the mercury removed. In six weeks successful removal of mercury contamination from the water supply was completed using activated carbon adsorption. Treatment continued, however, until all mercury residuals were removed.

Mercury in the environment often originates from natural sources such as ore bodies or volcanoes, as well as from man-made sources such as chlorine plants, fossil fueled power stations, and certain exterior paints.

In water the "natural" level of mercury is around 0.06 ppb and approximately 0.03 ppb in seawater. Because mercury salts are considered highly toxic to humans, precise analytical methods for its detection in water are required. The Bermuda water chemical analysis which was performed both by contract laboratories and Navy field laboratories revealed that earlier reported results were incorrect by a factor of ten.

The problem was finally resolved by LANTDIV environmental branch. It was associated with the atomic absorption unit, Perkin-Elmers model (403) parameters setting, and with standardization technique.

In conclusion, the mercury contamination of Bermuda Annex potable water serves to illustrate the need for continuing vigilance and a high level of concern for materials and practices generally considered harmless. Before painting water works, first consult the environmental branch of the engineering field division.

Methods of Analysis

There are a variety of methods used for mercury determination. The method to be used depends on the techniques available, the concentrations expected and the detection limits.

By far the most sensitive method for detecting mercury in water is by the atomic absorption flameless or cold vapor technique. The detection limit on a 100 ml water sample is fraction of ppb. Equipment used on the Bermuda water mercury analysis were: Coleman "50", Atomic Absorption Spectrophotometer, Perkins-Elmers models 403, 303, Beckman model "485" Atomic Absorption Spectrometers, and the Hach DR/2 Spectrophotometer Dithizone-MercuVer II method. The Hach has a detection limit of 3 ppb. For precise analysis of mercury in water the following hints are recommended:

- Establish what detection limits are required.
- Prepare standards containing mercury concentration not greater than twice the expected concentration in the water to be tested.
- Check the mercury lamp sensitivity and set the instrument on the most sensitive absorbance full scale.
- Zero recorder and check for maximum response.
- Calibrate the instrument daily. Read peak height or absorbance readout and establish a calibration curve peak height/absorbance versus concentration.
- If performed correctly, the curves should be a straight line.

Environmental Adjustment Factors

By A. D. LEWIS, P.E.
Facilities Planning Division, NAVFAC

• Alexandria, Va.

Traditionally the military services have provided community recreational facilities for military personnel and their dependents similar to those in civilian communities, in order to help maintain the morale and well-being of the men and their families. Initially, community facilities were provided because of the installation's relative isolation from comparable civilian facilities and the prohibitive cost of using civilian facilities as related to the military pay scales.

Several recent sociological and economic changes suggest that the traditional reasons and demands for community facilities on an installation are not as great as they were 10 or more years ago. The following conditions reflect these changes in trends:

• Increased pay and quarters allowances mean military personnel can choose to live off installation and can, in all probability, afford cars. Therefore, they are now more likely to use local civilian facilities. (This trend is expected to accelerate as the all-volunteer force becomes effective.)

• Greater mobility and expansion of U.S. population and subsequent urban expansion have left few isolated installations.

• Today's young military personnel have different views and interests than those of 10 years ago, resulting in diferent uses and demands for community-type facilities (*e.g.*, possibly less interest in playing baseball because it is now possible to leave the installation).

These factors led to the development of the Environmental Adjustment Factor (EAF) concept for community support facilities. The EAF concept was also impelled by the impact that these factors would have on facility requirements and the ever present requirement for prudent expenditures of non-appropriated, and operations and maintenance funds for military construction.

These EAF's published in NAVFAC's P-80, are currently providing planners with a mechanism for considering the impact that existing civilian and combined Navy/Marine Corps community facilities have on the requirement for specific support facilities.

The total potential savings utilizing this refined planning procedure (EAFs) will amount to approximately $100 million.

Illinois Pollution Control Officer Expresses Views

• Port Hueneme, Calif.

The chairman of the Illinois Pollution Control Board took a busman's holiday this summer, a change of hat assignment that could lead to added benefits for Navy and civilian environmentalists.

Jacob D. Dumelle spent two weeks of active duty at the Civil Engineering Laboratory of the Naval Construction Battalion Center at Port Hueneme, Calif.

A lieutenant commander in the Naval Reserves, he was assigned to the Navy Environmental Support Office (NESO), the deputy program manager for the Naval Environmental Protection Support Service (NEPSS) which provides environmental support data on ships, aircraft, and shore installations in the Navy's continuous fight against pollution.

In civilian life, Dumelle chairs a five-man board, heads a staff of 19, and is responsible for an annual budget of approximately $1 million. The board enacts all state environmental regulations, adjudicates all enforcement cases against alleged polluters, and sits in judgment of various variance appeals.

With NESO, he served as a consultant, reviewing programs and critiquing documents. "I requested the duty," he said, "since the work dove-tailed with my civilian position."

The request proved to be a two-sided benefit. Dumelle said he left CEL "favorably impressed with Navy pollution programs and the people who run them." But during his brief visitation of working and observing, he was able "to alert the Navy to several problems looming on the horizon." He mentioned three: (1) The possible impact of proposed complex sources regulations which could restrict expansions of military bases because of traffic generating vehicular gases, (2) probable regulations reducing strength of non-ionizing electromagnetic radiation, such as emitted from high tension power lines and transformers, causing psychological and physical discomfort, and (3) possible contribution of vegetation on military bases to increased smog conditions due to emission of natural terpenes into the atmosphere.

Dumelle said this conditon could prevail throughout Southern California.

"I'm taking back with me a better knowledge of the Navy's environmental program and details on specific developments of improved measuring techniques which I will pass to my civilian colleagues," he said.

The high level state official also called for closer liaison between the Navy and their civilian counterparts in the exchange of environmental protection information and hardware. "I strongly recommend more person-to-person contacts between federal and civilian environmental agencies," Dumelle pointed out. "It is getting so that we can't afford the luxury of reading publications and journals. Face-to-face visitations can and will do wonders in bridging communication gaps."

He also recommends that the Navy sponsor an annual meeting of a mixed review board to look into research and development within the environmental program.

"Hopefully, these meetings woul prevent the reinvention of the wheel," Dumelle explained. "Technology transfer is equally important within civilian environmental circles as it is within the federal government."

JACOB D. DUMELLE, chairman of the Illinois Pollution Control Board and a lieutenant commander in the Naval Reserves recently was on active duty for training with the Navy Environmental Support Office, Port Hueneme, Calif.

NOISE SUPPRESSION

By R. B. FOSTER, P.E.
Mechanical Engineer, Southern Division
• Charleston, S.C.

In the winter 1973 issue of *The Navy Civil Engineer*, W. B. Griffiths wrote of the AICUZ (Air Installation Compatible Use Zone) program to promote limiting the use of areas around air stations to purposes which are not adversely affected by high ambient noise levels.

In a related program, the Navy plans to abate aircraft noise, where possible, with a five year program estimated to exceed $120 million in cost. The effort is oriented toward abating noise generated by aircraft during ground run-up and by engines being tested out of the airframe.

The technical approach by the Navy to accomplish this noise abatement was initiated in April 1973 when the Southern Division, Naval Facilities Engineering Command, was requested to prepare a program cost estimate (PCE) for jet engine noise abatement at various locations. Prior to preparation of the PCE, a study contrast was awarded to accomplish the following:

(a) Develop a conceptual design for aircraft accoustical enclosures to reduce the noise level to 85 decibels at a distance of 250 feet from the center of the installation.

(b) Determine the feasibility of multiple-aircraft use of the enclosure.

(c) Determine the most economical construction for the enclosures and the most feasible method of accommodating the jet engine exhaust gases.

(d) Determine applicability of sound suppressors, which surround only portions of the aircraft, to the noise suppression program and provide related designs.

(e) Develop the most economical design for accoustical enclosures for engine testing out-of-airframe.

The study concluded that prefabricated metal buildings of modular design are more economical than cast-in-place concrete buildings. It was further found that an air-cooled exhaust system is more appropriate than a combined air-cooled and water-cooled system. The use of the air-cooled exhaust system, with its larger sized augmentor tube, also facilitates the use of one building for various aircraft types.

The modular type building can be sized for the largest aircraft operated at each particular base, and the exhaust system similarly would be designed for the base's aircraft with the greatest engine air flow.

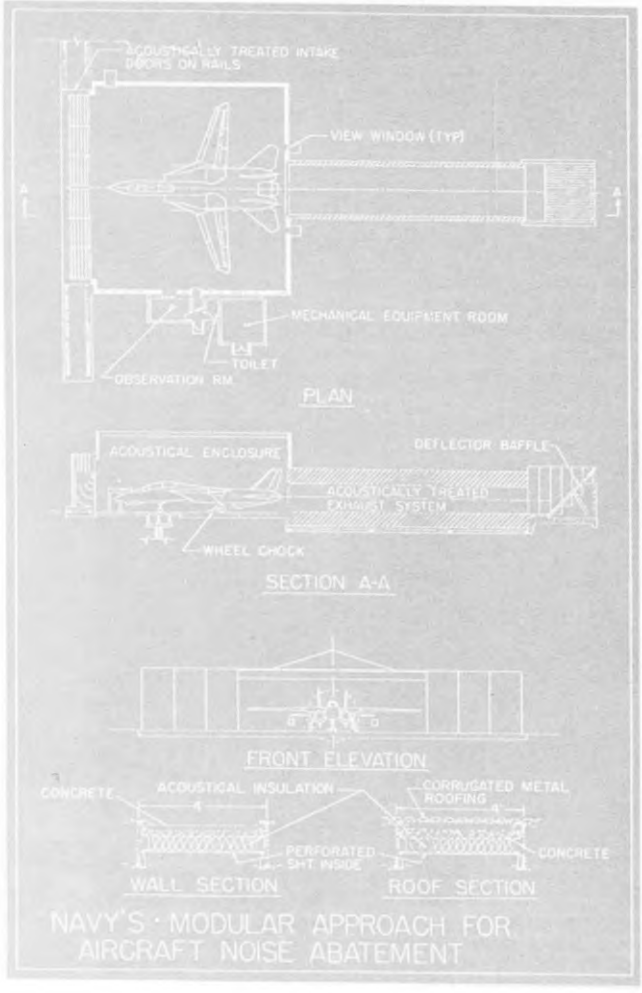
The study indicated that, in some applications, sound suppressors may reduce noise at less cost; although design of suppressors for multiple-aircraft use is more difficult, and in general they are not as effective as acoustical enclosures. Suppressors used for noise reduction for the S-3 aircraft with its wing-mounted engines, were found to be quite feasible. For engine out-of-airframe testing, a modular prefabricated metal building with a dry-type exhaust system was again found to be most economical.

Aircraft acoustical enclosure schematic designs have been prepared for various aircraft as shown in the accompanying table. Building type 1*a* could be modified to accommodate the S-3 aircraft by increasing the width to 84 feet.

	Inside Dimensions		Aircraft Served								
Building Type	Building W x L	Augmentor W x H x L	A-4	A-5	A-6	A-7	AV-8	F-4	F-8	F-14	T-2
1a	78'x84'	18'x11'x91'	x	x	x	x	x	x	x	x	x
1b	78'x84'	14'x9'x67'	x	x	x	x	x	x	x		x
2	78'x72'	19'x11'x91'	x		x	x	x	x	x	x	x
3	52'x64'	14'x9'x67'	x		x	x	x	x	x		x
4a	52'x64'	14'x9'x67'	x			x	x	x	x		x
4b	52'x64'	11'dia.x67'	x			x					x
4c	52'x60'	9'x11'x61'	x			x			x		x
5	42'x52'	7'dia.x51'	x								

A schematic design was prepared for an engine test acoustical enclosure with a 26′ x 56′ building size and a 16′ diameter by 80′ long augmentor.

Plans and specifications for a type 2 aircraft acoustical enclosure have been completed for the Naval Air Station, Miramar, Calif. Model studies are also under way, with the goal of optimizing design when the major construction project begins. A full-scale check on the model study findings will be made when the Miramar construction is complete.



ever hear a fish coughing?

scientists did and it may prove to be a valuable monitor

Everyone expects fish to swim, to jump and, occasionally, to be caught.

But who would expect a fish to cough?

Fish "coughs," are naturally-occurring phenomena which have stirred the interest of scientists at the U. S. Environmental Protection Agency's National Water Quality Laboratory at Duluth, Minnesota.

The coughing, which is a normal clearing process to remove debris which has settled on the gills, is a natural action of bluegill, sunfish, fathead minnows, and all species of trout and salmon.

Robert A. Drummond, the aquatic biologist in charge of the coughing fish project, said the study was initiated in 1971 to compile basic data on the effects of water pollutants on fresh water fish.

An unexpected spinoff from the study, however, is a possible means of monitoring the quality of lakes and streams by using fish as watchdogs.

Drummond said the most significant phase of the study involves a polygraph, similar to those used as a lie detector or for monitoring heart and brain impulses in hospitals.

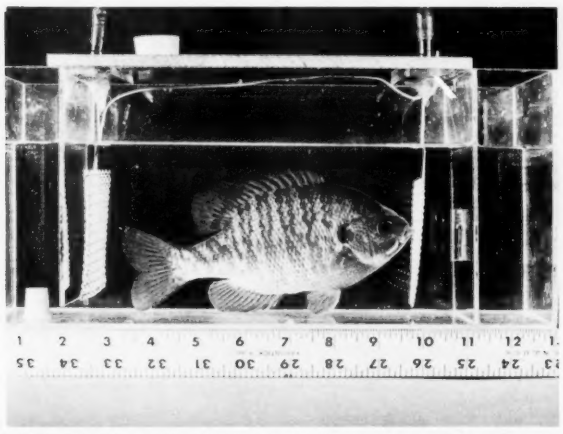
The apparatus is used to measure the number of coughs per minute among fish contained in separate aquariums called electrode-chambers and subjected to various pollutants. The fish are monitored for at least 24 hours before each pollutant is added, and then for a number of days afterward.

In tests with copper and mercury, it has been found that concentrations which increase the frequency of coughing significantly are approximately the same levels that have been found in related long-term studies to be damaging to fish growth and reproduction.

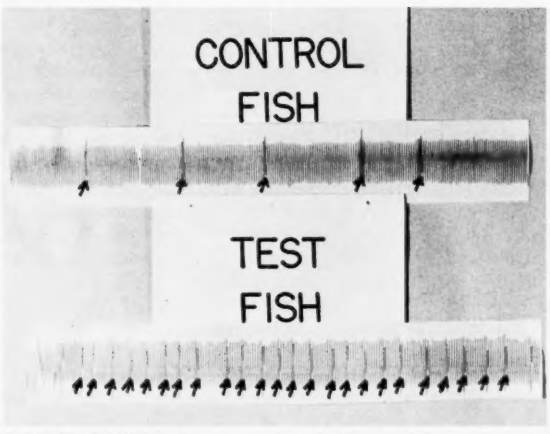
"The ultimate use of our findings," Drummond said, "could be a system for keeping tabs on concentrations of complex industrial wastes entering lakes and streams from waste treatment plants and industry. A sudden increase in fish coughs within a given body of water could trigger an alarm to warn plant personnel that potentially damaging effluent is leaving the plant."

Drummond said, "We don't yet know whether all or only some species of fish cough, but we plan to answer this question in later tests.

"We're currently looking at the short-term effects of 10 heavy metals and pesticides, and will be comparing the results with the already computed long-term effects. If the comparisons are favorable for this group, we feel the cough frequence test may be valid for other chemicals.



POOR FISH in electrode chamber where polygraph type instrument measures 'coughs' upon introduction of test pollutants.



COUGH GRAMS reflect normal periodic expulsions of control fish against that of test fish exposed to pollutants.

Planners For Major Activities

... *is there a pay off?*

By JOE SANDERS
Division Director
Installations Planning
Southern Division, NAVFAC

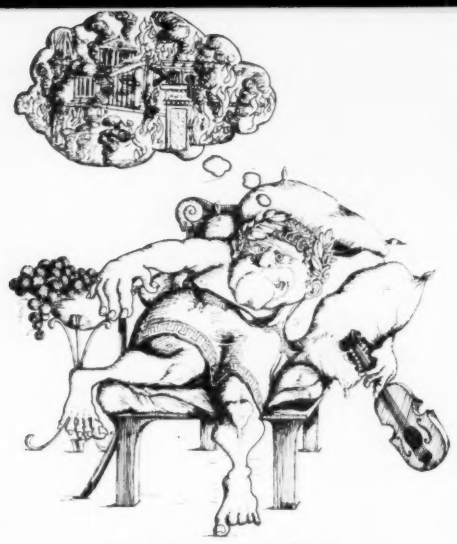


Illustration by John Roth

• Charleston, S.C.

"Everybody can pour concrete."

Counting all the people who call it cement, this is a true statement. Unfortunately, the results are 5000-pound concrete when 2500-pound would have been adequate, and worse, 2500-pound when 5000-pound was required. There is spalling, cracking, and disintegration.

"Everybody is a planner."

Counting all the people who think they're planners, this is a true statement. As a result, there is too little or too much planning, and worse yet, no planning.

Projects are "killed" because of poor documentation, and projects are sited in conflict with the master plan or sound planning concepts based on some personal qualm or the proximity to a four-inch sewer.

The above remarks are not intended to imply that the Navy has no planning or has poor planning. Surely everyone recognizes the vast improvement in planning and programming in the last ten years. Considering that efforts of all echelons are beginning to bring about orderly development of activities, it could be said that "all is well."

However, it does appear that there could be better planning at the field activity level.

Specifically, an "activity planner" for all major activities is suggested.

Some activities now have full-time planners and even staffs; some have planners on a collateral duty basis, and some have none. Activities with full-time planners probably do the job with less pain than the latter ones. The latter ones are likely to be those who interpret "the activity shall initiate" as meaning "request the engineering field division (EFD) do it." There is nothing wrong with this approach if the EFD has the resources and local knowledge is not a requirement for good planning.

In general terms, without getting into a position description, just what is an "activity planner"? He can best be described as a person with broad knowledge who can fit together what apparently are many unrelated pieces into logical order so that the resultant conglomeration is meaningful and useful.

He can also be described as the activity's "cradle-to-grave" expert. By this is meant that he knows the history of the activity in terms of what was done and why. He relates this to the existing conditions, knowing that there were usually good reasons why things exist as they are now. Knowing everything possible about the activity, and what's going on within and around the activity, he projects the activity into the future, paving the way for the activity to accomplish its future mission and tasks. In other words, he keeps the activity flexible from the standpoint of providing and accommodating facilities to accomplish future missions.

Backing up to the facetious statement "everybody is a planner," it is more true than false. The supply officer plans supply operations, the air operations officer plans air-related operations and states what he needs, and the public works officer plans to provide transportation, utilities and services for the activity.

But who coordinates all the planning? The obvious answer is that the commanding officer is totally responsible for his activity, and he does it. If he is too busy, he delegates it to the executive officer who may in turn delegate to the public works officer.

Think for a moment of all the elements and detail of command. Does the commanding officer, or others to whom he may delegate, have the time to do the job? Can he spare the time to be concerned with details of the planning system, participating in and implementing a master plan, planning criteria, Air Installations Compatible Use Zone (AICUZ) (if an Air Station), community planning which affects the activity, and the many other planning facets? Can he provide much-needed continuity of planning over an extended period of five to ten years? If answers to these questions are negative, then what is the answer?

Should each major activity have an "Activity Planner," and, if so, is there a pay off?

First, consider the payoff in the preparation of a master plan. The master plan is accomplished by EFD planning teams or by A&E contract, but it will only be as good as the input from the activity and commands concerned. The planning team or A&E should always have a single point of contact, or liaison, and it should be an activity planner. Time could be saved and "blind alleys" avoided if the activity planner provided the planning team factual history of the activity, existing conditions and problem areas, projected loadings and future mission, and community relations.

The planner could also arrange interviews with department heads and others from whom information is needed or with whom problems should be discussed. He would have information available at his finger tips when needed by the planning teams. He could arrange for presentations, provide command input, and in effect be an *ex officio* member of the planning team.

By this type of participation, the activity would be more inclined to

think of the master plan as its product, which it really is. Many conflicts could be avoided with the activity planner and planning team developing the plan together. At least the conflicts would surface and be resolved before final presentation of the master plan.

Secondly, consider implementation of the master plan. Just who is responsible for this important task? Is it the activity, EFD, NAVFAC, or command? Surely the master plan must be implemented or its preparation will have been wasted effort. Who is in the best position to implement? Is it the EFD many miles away or NAVFAC, even further removed, or is it at the activity level?

A plan can only be implemented by one who understands it and by one who is aware of conditions at the time of implementation. By having participated in the preparation, and by staying abreast of changing conditions and future workload, the activity planner would be the most logical person to implement the master plan, or at least initiate the necessary action. It would be difficult for even the most mentally gifted to understand at a glance a master plan which takes an average of four man-years to prepare. It may be more difficult to recognize when a plan is outdated and cannot be implemented, requiring a change in concept, than it is to implement. Again, the activity planner would be in the best position to make such a determination.

Is there a payoff in having an activity planner in facilities planning, which, for purposes of this article, is defined as effort expended from recognition of deficiencies to project approval?

The first step of the planning system is the Basic Facilities Requirements List (BFRL), assuming data, equivalent to that required in the Logistic Support Requirements Plan (LSR), is available.

Current directives require that it be initiated by the activity with assistance from the EFD if required. Some activities are not staffed to prepare the BFRL, and in some cases, even to assist. Under such circumstances, the only way to get the BFRL is for the EFD to prepare it. Even after the BFRL has been prepared by the EFD, some activities, not properly staffed, take up to six months to review it and their review is sometimes questionable. Preparation of the BFRL entails gathering of base loadings, mission, tasks, and workload of the activity and its tenants and applying these to facility planning factors (NAVFAC P-80).

This all sounds very simple, but you may be assured it is not. Experience shows that getting a valid projected base loading is a most difficult task. So is the proper application of planning factors to loadings and tasks. The factors are to some extent "averages" for all activities and require judgement in application to a particular activity. Who can better prepare a BFRL than an activity planner fully dedicated to planning?

The next step of the planning system is the engineering evaluation which determines what facilities the activity has and their exact condition. This step is accomplished by the EFD, but the activity must, or should, play a vital part. Since a commanding officer must concur in the findings, activity personnel must participate in the evaluation so that he has a basis for concurrence. Furthermore, the real property inventory (RPI) must be in consonance with the engineering evaluation.

A dedicated activity planner could make the engineering evaluation almost a formality. On a day-to-day basis, he could keep it updated, based on input from maintenance reports, use changes, and RPI submissions. These could be submitted periodically rather than waiting two years for the formal EFD evaluation.

Another step is the determination of excesses and deficiencies, and more importantly the determination of how to satisfy these deficiencies. Often neglected, this is the most important part of the planning system and the one in which the intimate knowledge of the activity planner would provide the biggest payoff. The familiarity with the BFRL, the current engineering evaluation, and the master plan would enable him to know immediately if a new task can be accommodated in existing facilities or if a new facility is required.

If a new facility is required, he would know exactly how to prepare and submit the project. The EFD gets many calls for assistance in preparing a military construction or other type projects, most of which are routine. A person experienced in preparing projects can do so in a few hours while the inexperienced may take days.

The inexperienced may not meet submission deadlines, may have it returned due to inadequate information and justification or, believe it or not, may expend effort needlessly. Initial submissions have been received with full documentation including facilities studies, economic analyses, environmental impact assessments, and detailed drawings when only a change in the OPNAV Form 11000/4 (Summary for Correction of Facility Deficiencies) would have sufficed to get the project into the military construction program.

If, as often happens, the project does not make the program, much effort has been wasted. An experienced planner would know that the entire planning and programming system is a series of refinements, starting out very generally with details being developed through subsequent submissions, program cost estimates, and final plans and specifications. Knowing "what" to submit "when" would pay off.

Do not think that moving the planning function from the EFD to the activity is advocated. More participation by the major activities could result in less effort by the EFD. However, this is not the main reason for more activity participation. It would be a better planning product since the best planning comes from a joint activity-EFD effort. The EFD, under present ceiling and dollar constraints, has its hands full of planning requirements. If the major activities assume some responsibility, EFD effort could be directed to the more difficult or unusual tasks outside the capability of the activity planner, such as master plans, major studies, and unique problems. The EFD could also provide better planning service to the small activities which cannot utilize or afford a full-time planner, and to major commands.

"Everybody is a planner."

Construe this to mean that all key personnel of major activities have a part to play in planning. Go a step further and recognize that the input from key personnel must be coordinated and packaged to be useful, and this can best be done by a person designated as an activity planner.

There is a payoff — adequate facilities at the proper time at the right place to efficiently accomplish assigned mission and tasks.

"the planner is the 'cradle-to-grave' expert"

SEABEES IN THE BRINEY

By LTJG ROBERT H. MAYER
Assistant Director, Ocean Engineering Program Office, NAVFAC

• Alexandria, Va.

In the mid 1960's, concomitant with increased demands for resources to support a growing population, came a new national policy encouraging technology development towards economic utilization of marine resources. The U. S. Navy has since been instrumental in expanding man's ability to work effectively under water. To ensure effective utilization of this developing technology, the 31st Naval Construction Regiment developed a basic training course in underwater construction for divers of the Naval Construction Force (NCF). It provides instruction in the use and maintenance of the specialized tools and equipment and training in the techniques used in building and maintaining fixed ocean structures.

The course includes instruction in: diving equipment operation, maintenance, and safety; diving operations; underwater site surveying; underwater construction blasting; and underwater construction operations.

For example, the underwater construction blasting instruction familiarizes the trainee with rock drilling and blasting equipment and materials necessary for underwater site preparation (e. g. excavation and rubble removal). It includes a week of instruction at San Nicolas Island, Calif., where trainees plan, place and detonate explosives underwater.

Classroom and in-harbor instruction also includes proficiency training in the use and maintenance of diving equipment such as the KMB-9 diver mask, the unisuit and wireless diver communication systems, and a variety of hand and power tools utilized in underwater construction.

Finally, the trainees, as a unit, perform a complete facilities construction project, such as installing and stabilizing an inshore submarine cable or pipeline and/or emplacing a diver habitat-control center. The project simulates an actual requirement and involves site survey and selection, construction procedure planning, mobilization, facility assembly and installation, final inspection testing and facility recovery.

This 10-week course is a significant milestone in developing the skills essential to the NCF in fulfilling its responsibilities for all military-executed underseas facility construction. Since the initial pilot course commenced in the spring of 1973, 35 divers from UCT-1, UCT-2 and the Civil Engineering Laboratory have successfully completed the course and received the Underwater Constructor designation, signifying their capability in the construction of fixed ocean facilities.

Modern Forest Management

By R. M. READ
Atlantic Division, NAVFAC
• Norfolk, Va.

"The management of military woodland is the application of technical forestry principles to the operation of the forested property."

This quotation from a NAVFAC instruction is best accomplished by first the creation of a forest management plan, a document which brings together the guiding principles necessary for the development and control of the forest into an orderly working arrangement.

The forest may be divided into areas called working circles from which a sustained yield of forest products is planned. Management plans are written for a specified period or cutting cycle during which time all portions of the working circle are logged in an orderly fashion. The purpose of the cutting cycle is to enter all operable stands of timber to remove mature and poor risk trees in advance of deterioration and to improve growing conditions of the residual trees.

Upon completion of the cycle, usually in ten years, the plans are revised to cover an additional ten years, and every decade thereafter, until the timber crops have attained a specified condition of maturity called rotational age.

In 1963, with the need for management plans clearly established and with the backing of other pertinent NAVFAC instructions, the Atlantic Division (LANTDIV) developed formal plans for implementation on 85,000 acres of Navy and Marine Corps lands having potential timber production. Activity forests were divided into compartments of approximately 1,000 acres and sub-divided into stands for management. Each stand was visited and a prescription was written detailing the work planned for the next ten years.

The work covered such facets of forest management as fire suppression, reforestation, timber stand improvement and timber harvesting. As a result of the latter, some $2.5 million were deposited in the U. S. Treasury, providing an excess of almost one million dollars above gross expenses!

It is now time for revising these plans and bringing with it the detail of an updated inventory. After careful analysis we found our problem partially solved. Ten years ago we enumerated compartments and stands, classified the stands by timber types and established continuous forestry inventory (CFI) plots. This is still useful information.

Only standardization was needed in the type of inventory plot we were to use — variable or fixed radius. The variable radius method was selected because this type of timber cruising places emphasis of measurement on the larger trees that contribute most significantly to total volume.

Since the inventory weighted heavily on the selection of the larger trees, a method for precisely measuring these trees was needed. Aid was obtained from the U. S. Forest Service's state and private forest management systems specialists in Atlanta, Ga.

FORESTER uses a dendrometer to measure out-of-reach diameters and heights of standing trees to calculate tree volume.

These experts provided us with a unique and revolutionary method for estimating the volume and quality of standing timber, called the STX system, based on the use of the STX computer program.

The system was invented and introduced in 1963 by L. R. Grosenbough, a mensurationist with the forest service. STX methods are more accurate, more efficient, more flexible and more consistent than earlier methods. STX uses 3P sampling, a method in which the probability that a tree will be selected as a sample is proportional to a prediction of volume or height made for each tree in the population being sampled.

The STX system uses optical dendrometers, an instrument for measuring out-of-reach stem dimensions on standing trees. The dendrometer is a modified military rangefinder that measures tree diameters and heights indirectly at distances up to 250 yards.

STX 3P sampling is a first in Navy forest resource management which has or soon will be applied on at least five activities within the LANTDIV area. It is being widely and increasingly applied on forest industry lands. The information gathered furnishes the forest manager with accuracies hereto unattainable at about one-third the cost of conventional methods. Even greater savings will be realized with the next inventory because most of the data will have been gathered and programmed.

New plans at Atlantic Division will stress multiple use land management to an even greater degree than in the past. They will prescribe not only a 10 year program for the entire forest but will be designed to harmonize with the resident wildlife species, will favor aesthetics, reduce soil erosion and protect streams and lakes from contamination and siltation.

With new uses being developed for forest products, new approaches to timber manufacturing and greater emphases placed on multiple land use, the Navy must have a flexible plan to keep abreast of these trends. This, it is believed, LANTDIV has done with the new inventory system and increased multiple use of our forest lands.

Lease Construction For Overseas Homeports

By A. G. BRYANT, P.E.
Atlantic Division, NAVFAC

• Norfolk, Va.

Facility support for homeporting U.S. Navy ships for two to three years at designated ports in the Mediterranean area has developed from the initial planning stage to encompass nearly all facets of contract administration; i.e., minor military construction, Seabee construction, leasing and lease construction. The initial requirements that permanent bases would not be constructed and that dependents would be housed in local communities to the greatest possible extent prompted the use of lease/lease construction.

Determining the most feasible homeporting areas and the necessary facilities was a sizeable task with many possible solutions. NAVFAC's Chesapeake, Southern and Northern engineering field divisions assisted in the initial planning. After port sites were selected, Chesapeake and Southern division personnel assisted in leasing the interim support facilities. The Mediterranean homeporting sites selected were near Athens, Greece, and on the island of La Maddalena, Sardinia, Italy.

The lease construction program that was developed included pier facilities with cold-iron utility service, commissaries/exchanges, housing, schools, etc. The program concurrently was developed with the Navy's negotiations for use of the homeporting sites; and consistent with lease and lease construction procedures for facility procurement. While regulations govern *circumstances* under which lease construction can be used, and the approval levels required, there were no established criteria for procurement procedures and documentation. The program was so large and had such high level interest that thorough documentation of procurements was considered essential. Turnkey procedures, as used in the administration of family housing programs, were chosen as guidelines for construction under the lease construction concept.

The first proof of the effectiveness of these procedures was demonstrated in connection with pier facilities at Elefsis, Greece (15 miles due west of Athens). The pier supports six destroyers and one hospital ship, nested four abreast on one pier side and three abreast on the other. The site is leased from the Elefsis Port and Industrial Authority and comprises approximately one acre of land for access.

The request for proposal (RFP) stipulated that the pier should be removable, and it included three pier concepts the Government defined as 'removable.' Included were the specification governing all materials of construction, design parameters for the ships utility support and utility system requirements. Proposers were encouraged to use their imaginations in developing the 'removable' concepts. In Greece, it was found we could rely on stateside specification for quality.

Five design proposals were received on 29 January 1973, with concepts ranging from precast concrete sections on steel piles and precast cap with

sections formed and connected to facilitate disassembly; to a pontoon on steel piles; to a stripped cargo vessel ballasted with rock and water and sunk in place with the bow section supporting a precast concrete trestle from which the pier would connect to shore.

A technical evaluation team had prepared an evaluation manual using the turnkey concept of point evaluation. The team rated each proposal on its technical aspects, without knowledge of pricing, then a selection board reviewed the technical findings. At this point, the pricing of each proposal was revealed. Each proposer had provided annual lease costs for the five-year life of the lease and purchase cost at the end of the fifth year. Each proposer's pricing was adjusted to a net present-day value for use in determining dollar per point ratio to reveal the proposal yielding the most construction per dollar. All board actions were documented by board report. From their review, the board selected the winner, the precast concrete sections on steel pilings designed by the joint venture of Basil-Heery-Praeger, Architects-Engineers.

The lease was executed on 4 April 1973 with a 4 January 1974 construction completion date. The construction contract was awarded to the joint venture of Odon & Odostromaton, S.A. and Archirodon, S.A., an Athenian contractor. The lease value over five years is just above $3 million.

Another facet of the pier project is the use of MUSE (mobile utility service equipment) for cold-iron utility requirements; i.e., steam, power and potable water. Steam is not available in Elefsis and power is 50 hertz rather than the 60 hertz operational requirement for the ships. Potable water is not available within practical distance of the pier. The pier utilizes two 20,000 pph boilers, two 1,500 KVA diesel generators, two 750 KVA diesel generators, two 2,500 KVA substations and one 300 KW DC rectifier. Water is furnished from a 6,900 barrel barge located adjacent to the pier.

Homeporting recently took another giant step toward facility completion with the consummation of lease construction contracts in La Maddalena, Sardinia, Italy, for 248 family housing units, an exchange/commissary store and a school (three separate contracts). These lease construction contracts were administered in the same format as that used for the pier.

...the construction design

By CDR A. KARTALIS, CEC, USN
and
CHARLES D. MORRISSEY

On Monday, 1 October 1973, the *USS Manley,* a destroyer attached to the United States Sixth Fleet, was the first naval vessel to berth in the port at Elefsis. The destroyer pier was operational and was accepted by the Navy 174 days after receipt of instructions to proceed with design and construction — 101 days earlier than specified. The design and construction of the 45,000 square feet of offshore structures and related work were completed in less than six months. The project was a remarkable success as a novel approach to facility acquisition by the Navy. The contractor's success in completing the project far in advance of schedule was equally remarkable.

From the outset the designer and builder worked together closely to insure that structural, mechanical and electrical systems were compatible with equipment and know-how available to the contractor and that the most readily available and economical materials were used. This very close relationship was maintained throughout the construction period to expedite the purchase of equipment and to review construction techniques and materials. They were able to anticipate problems and prevent delayed construction, with a constant emphasis on quality. A representative of the designer was on site throughout construction to observe the work and assist in maintaining quality control.

The request for proposals included a 22-page description of the project, outlining basic characteristics, functional requirements, details of critical elements and systems and a proposed lease agreement with appropriate purchase, renewal and cancellation options. Design concepts and choices of materials were left to the proposers, subject only to functional and design code requirements.

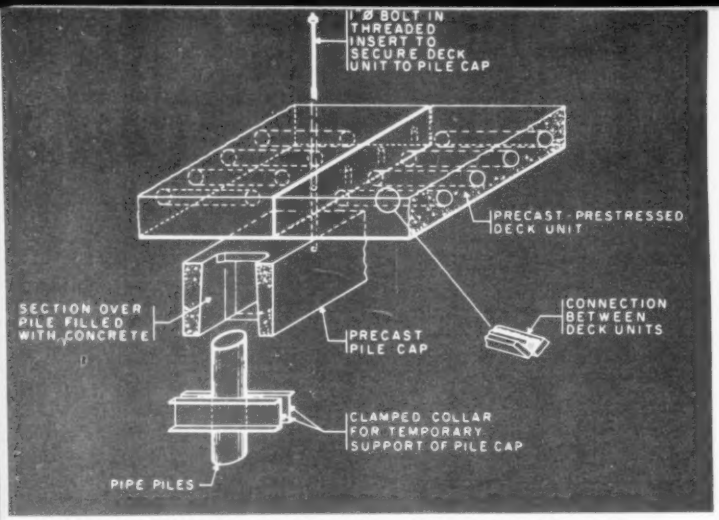
The Basil-Heery-Praeger design used a structural system of prefabricated, prestressed concrete units supported on driven steel pipe piles. This system has been used in a number of permanent waterfront structures, and variations of time-tested erection and assembly details were developed to accommodate the requirement that the pier be relocatable.

The structural system included driven bearing piles on which steel brackets were bolted, aligned and then welded; precast, reinforced concrete pile caps with openings into which the tops of the piles extended and which subsequently were filled with concrete; and precast prestressed slabs which sit on the pile caps and were connected by bolting and welding. The simple and efficient system allowed the contractor to work from shore over previously placed construction.

Erection moved rapidly, with the pace set by the pile driving. Each day, three piles were set and driven for a trestle bent as pile caps and deck slabs were cast and cured on shore. When the trestle bent piles were completed, a large floating crane set all ten trestle bent caps in one day. During the following week the approach trestle structure was completed as all forty deck slabs were set.

While the trestle was being com-

PIER UTILITIES duct carries steam, water and electrical lines.


1 Ø BOLT IN THREADED INSERT TO SECURE DECK UNIT TO PILE CAP
PRECAST PRESTRESSED DECK UNIT
SECTION OVER PILE FILLED WITH CONCRETE
PRECAST PILE CAP
CONNECTION BETWEEN DECK UNITS
CLAMPED COLLAR FOR TEMPORARY SUPPORT OF PILE CAP
PIPE PILES

CONSTRUCTION SKETCH of the system utilized at the Elefsis port.

...the construction design

By CDR A. KARTALIS, CEC, USN
and
CHARLES D. MORRISSEY

Continued from preceding page

pleted, pile driving continued on the pierhead at the rate of one bent every two working days. As the bents were completed, pile brackets were set and aligned and pile caps and deck units were placed. The basic structure was erected in approximately 50 working days, some 80 working days after notice to proceed.

Meanwhile, work proceeded on an equipment platform and mechanical and electrical systems, lighting, fenders and other finishes. Pier utilities included high pressure steam, potable water, electrical power and telephone service. To facilitate installation and maintenance of the pier utilities, steam and water mains run along one side of the trestle and pierhead under special ⊓ shaped deck units, fabricated with removable top sections to provide access from above so that pipes could be installed and worked on from the pier deck, rather than from a floating work platform.

The power plants supply 16 ships' power outlets. The steam plant connects to an 8-inch main serving four steam supply stations on the pier. Potable water is supplied from a water barge through a pressurization system to four ships' service outlets. Each water station consists of four two-inch outlets equipped with backflow preventors and pressure regulators.

Originally it was proposed to mount the MUSE equipment on a pile-supported platform similar to the pier; however, the contractor learned of the availability of an LST which had been stripped of its superstructure and aft compartments and was now configured as a barge. It offered several advantages, including a significantly larger area on which to mount the equipment and compartments in the hull to store fuel oil and potable water. The Navy agreed to the modification; a fortunate decision, as the equipments furnished by the government were larger than originally indicated and the additional space became essential.

Available equipment was mounted on the barge deck, then it was towed into position and sunk on a prepared rock fill bed. The remaining equipment was then installed and connections were made to the pier distribution systems. After mechanical and electrical systems were checked, the Navy lost no time in using the pier; the *USS Manley* was at dock early in the morning on the first day the pier was officially accepted.

For those support facilities not available through the local economy or existing DOD activities, a deficiencies list was prepared, and these are being satisfied through the lease or lease construction concepts. Additional facilities provided to augment the Fleet Support Office, Athens, included offices, a small dispensary, warehouses, a post office and a 400-student school. A compound is undergoing final procurement actions preparatory to contract, to provide athletic, recreation and morale facilities specifically for single and unaccompanied persons.

The pier and its associated cold-iron support was the largest project and the most unique. The agreement with the Greek government included the provision that upon the U.S. Navy's vacating the premises, the pier had to be removed. As designed by the successful joint venture, the pier can be removed and re-erected in another location within five months.

Under the lease or lease construction concept, the Navy is only a tenant, with the facility belonging to a private owner. Thus, the Navy is responsible for only a portion of the maintenance, the degree depending on the agreed terms in the contract. The Navy is obligated for a five-year lease period for the pier with options to renew for an additional five years on a year-to-year basis. The Navy does, however, retain the option to cancel the lease at any time by paying a stipulated penalty. This project successfully met all terms of the contract and in particular the contract completion time, which was exceeded by better than three months.

VIEW FROM THE DECK of the USS MANLEY to mobile utility support equipment (MUSE) which provides 'cold iron' service to the fleet.

'Self Help' Brings A New Chapel To Washington

By LTJG J. J. GARVEY, CEC, USNR

• Washington, D.C.

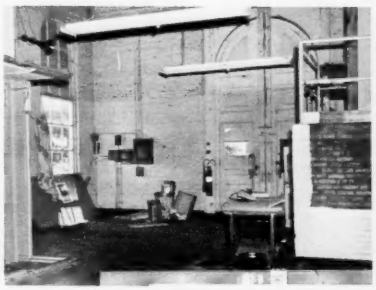
In the early part of 1974 a new Washington Navy Yard Chapel was officially dedicated as RAdm Arthur G. Esch, commandant of the Naval District Washington, accepted the keys from Capt. John F. Dobson, CEC, USN, public works officer, Headquarters, Naval District Washington. J. William Middendorf II, then under secretary of the Navy, and Adm Elmo R. Zumwalt, Jr., then chief of naval operations, participated in the dedication ceremony and RAdm Francis L. Garrett, Navy chief of chaplains, gave the dedicatory address.

The idea to provide a chapel was originally conceived in the master plan for the yard. Authorization for it as a self-help project was received in April 1972, and Chesapeake Division proceeded with design of the new chapel. The public works department of Headquarters, Naval District Washington was assigned the construction portion of the project. Initial preparations began under the direction of Lieutenant (j.g.) William J. Spindler, CEC, USNR and the project was completed under the author. Members of Detachment 54, RMCB 23, supplemented by active duty personnel, participated in the project. Much credit for the chapel's renovation goes to two members of RMCB 23: BUCS Carlton Bittinger and CE1 Charles J. Janiszewski, both of whom returned to temporary active duty to direct the project's workers.

The concept of the design was to create a modern motif with the antiquity of an historic building. The chapel is located in a 73-year old brick building once used for the manufacture of guns for battleships, cruisers, destroyers and other combat vessels. Only the brick shell remained in its original state.

A new slate floor, stained glass windows and a choir loft were installed. Pews for 90 worshipers were provided, and an additional 30 can be accommodated in the choir loft. A patio was constructed adjacent to the chapel. Trees and shrubbery complemented the scene.

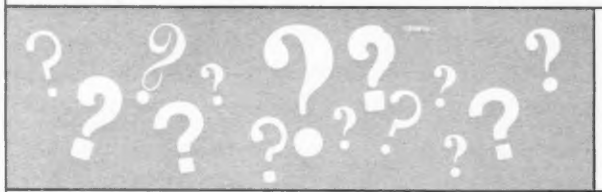
The chapel is located one block west of the U.S. Navy Museum in the heart of the Washington Navy Yard.



From Cannons To Canons

THE 'BEFORE' is pictured at above, top, while the 'after' is viewed from the altar to congregation and choir.

SANCTUARY and altar of WNY Chapel as viewed by the congregation.



MANAGEMENT INFORMATION PLEASE!

By DAVID G. BROWN
Southern Division, NAVFAC
• Charleston, S.C.

When is a management information system not a management information system? Who cares? What difference does it make to an engineering organization?

I'll give you an answer in one short paragraph, but first a bit of history to set the stage.

About five years ago, NAVFAC made a major policy decision for a total systems approach to the automation of management systems for planning, acquisition and maintenance of facilities. As an outgrowth of this decision, the Navy Facilities System (NFS) was born, to be the management information system (MIS) for NAVFAC. The scope of NFS includes every type of NAVFAC organization and every major functional area. It touches almost every management position anywhere in the NAVFAC family or organizations. It is the thread that links the headquarters proponent, the EFD department head, the CBC supervisor, the station PWO and the functional managers of special programs.

Volumes have been written for and against management information systems in general. Some very respected authorities have argued convincingly that no single MIS could succeed. But most of these writings are primarily of interest to systems people, academicians and publishers. The finite pros and cons of MIS, the hair-splitting distinctions in definitions and scholarly re-statements of old arguments are of little concern to the professional engineer and manager in NAVFAC. NFS is the management information system he will use.

Therefore, the answer to the second question is that anyone who is, or ever hopes to be, a NAVFAC manager should care when *his* management information system is not a management information system. This point should be stressed to PDC trainees and CECOS students.

The policy decision for total systems was accompanied by two very significant implementing decisions. One was the commitment of resources to support the effort, and the other was acceptance of a "proponent management" philosophy. More will be said later on these decisions, but suffice it to say now that they will ultimately be credited for the success of the system. And success will come. Some success has already been realized, but the best is yet to come.

Few systems have been planned, documented and officially supported by top management as well as NFS. The initial strength of good planning and documentation is a direct result of early command support through commitment of resources. Initial systems promotion was also strong. Briefing teams visited field sites periodically, preaching the latest NFS word. Multi-colored charts and systems buzz words filled the air like it was MIS heaven.

But somewhere along the way this initial impetus faltered, and with it systems effectiveness and acceptance. After several years of operations, user evaluations of NFS run the spectrum from "its the greatest" to "it's almost useless". Somewhere between these two extremes is the truth and the base point for effecting future improvements.

It is obvious that the above subjective judgments are open to question. To my knowledge, no overall official user evaluation of NFS has been made. But a user survey at one engineering field division revealed some interesting information. If such a survey can be considered representative, the trends indicated can be used to prompt actions to promote increased effectiveness. The survey population consisted of everyone in a supervisory/management position.

Questions were designed to determine the extent that EFD/MIS is used as a management tool, the ADP background of functional managers and recommendations for future training. Some pertinent results are: only 30% of those in management positions use EFD/MIS to a significant degree as a management tool; 20% neither receive nor use systems outputs; 50% have no ADP background beyond on-the-job training; 35% have no ADP training; 98% recommend some form of training; and 65% recommend a short "ADP Orientation for Managers" course.

Even if the survey method falls short of statistical purity, the conclusions are inescapable. You can not have a management information system without management involvement. Further, you probably will not have management involvement until managers are trained to understand the dependence of their functional discipline on MIS products.

As mentioned above, NAVFAC has adopted a proponent-run management philosophy. This is a good approach which I fully endorse and support. It is the best way to avoid the 'tail-wagging-the-dog' situation which has killed more than a few systems efforts. But for the proponent approach to work effectively, it is essential that functional managers — as proponents — know how to define their requirements to systems people. It is not necessary to train engineers as systems analysts or to teach systems analysts an engineering discipline — but the two groups must be able to communicate with each other.

Another conclusion from the survey is that you can not have a management information system without valid information. Some respondents indicated they received system reports regularly but did not use them because of lack of confidence in the information. Here again, under a proponent-run system, functional managers should insist on the reliable information they need for management purposes.

The third conclusion is that the system has not delivered all that has been promised. This is true now and probably always will be. But that is not to imply that improvements can not be made. For example, common data base is still a promise; we have multiple inter-related applications, but not a true system. Strong delivery on a basic promise like this will go a long way toward enlisting the willing involvement of functional managers.

Finally, to answer the first question. A management information system is not a management information system when you are missing any of the three elements — management, information, or system. All three of these elements must be presnt to give you the tool you want and need.

NAVAL CONSTRUCTION FORCE REVIEW

By LCDR J. L. HORACEK, CEC, USN
Head, Seabee Capabilities Branch, NAVFAC

• Alexandria, Va.

Satisfying the demanding construction requirements of the fleet, Seabees continue their world wide employment. The Atlantic Fleet Alert Battalion, NMCB-40, worked on projects at their main body site in Rota, Spain, and had detachments at Sigonella, Sicily; La Maddalena, Sardinia; Souda Bay, Crete; Nea Makri, Greece; and Holy Loch, Scotland. Projects were as diverse as the locations, including Ordnance Security Area fencing, an Admin/Exchange Building, BEQs and BOQs, a gymnasium, a dispensary and various other base facilities. On 20 March, NMCB-1 relieved NMCB-40. Turnover projects were assumed in Rota by the battalion and included the air cargo apron, a commissary warehouse, and an EM club. NMCB-1 has similar details located throughout Europe and the Mediterranean as well as a Seabee Team on Ponape in the Trust Territories, Pacific Islands (TTPI).

In addition to a Seabee Team on Yap in the TTPI, details from NMCB-3 are employed at Bermuda; Guantanamo Bay; Vieques, Porto Rico; and Ponce and Andros Islands. The main body of NMCB-3, located at Roosevelt Roads, P.R., continued several paving projects, started the construction of the hospital warehouse, and commenced site work on the BEQ projects.

With details located in Adak, Alaska; Atsugi, Japan; and San Miguel, Philippines; as well as a Seabee Team on Truk, TTPI, NMCB-62 appears to be the most widely dispersed battalion. The main body of NMCB-62 on Guam is completing paving repairs at the naval magazine and many personnel support facilities such as the communications station, CPO club, and the medical regional center swimming pool.

After relieving NMCB-5 on Okinawa, NMCB-133 continued construction of the ASP security fence and the Camp McTureous SNCO Club. In the Philippines, the NAS Cubi runway support facility approached completion, and the perimeter road project continues. Details at Iwakuni, Japan and Taiwan continued work on various base facilities. A second Japan detachment deployed to Misawa to construct arresting gear and optical landing system projects. Rounding out the four Seabee Teams, one from NMCB-62 is located at Truk, TTPI.

On Diego Garcia, NMCB-4's priority job, the Charlie Site facility progresses on schedule and the BEQ/BOQ projects continued on or ahead of schedule. The primary road project is also progressing, with over two miles of asphalt completed to date.

The month of February brought the Deep Freeze-74 construction season in the Antarctic to the end. Prior to redeploying to homeport, NMCB-71 completed and turned over the diesel generator plant in McMurdo as well as major construction items previously scheduled for Deep Freeze-75.

Both of the Amphibious Construction Battalions, 1 and 2, kept engaged primarily with fleet exercises and other training operations. Additionally, the Seal Beach Detachment from Amphibious Construction Battalion 1 continued with the removal of the Anaheim Bay Bridge, and the Hawaii Detachment dismantled 11 major structures and they extracted wooden piling in Pearl Harbor and on Lau Lau Nui Island.

CBUs continued their work on projects aimed at improving the habitability of the Navy's shore establishment. CBU 401 completed an auto hobby shop at Great Lakes, III, while CBU 406, located at Lemoore, Calif., added the finishing touches to an auto parking shelter designed to provide safe, inside storage for the cars of Navymen deployed overseas. CBU 405 at San Diego recently completed a handball court at the Chollas Heights Communication Station. March 1974 marked the disestablishment of CBU 408 at Newport, R.I. Its accomplishments as a unit are well documented and their efforts have contributed greatly to the success of the Navy's habitability program.

MCBC Davisville has probably seen the last of deploying Seabees for some time to come. Following the October 1973 Shore Establishment Realignment (SER) action, the home of the Atlantic Fleet Seabees drafted plans to reduce its mission significantly to that in support of a mobilization requirement. NMCBs 71 and 40 officially shifted to Gulfport and Port Hueneme, respectively, on 30 June 1974. UCT-1 moved to Norfolk on 1 July 1974. CBLANT moved to Norfolk in August, and NMCB-1 will relocate to Port Hueneme in November 1974, followed by the disestablishment of NAVSCON that same month. The 21st NCR will be disestablished in January 1975. By July of 1975, CBC Davisville will be at its reduced mission level as a stocking activity for PWRS.

ON ADVICE OF COUNSEL

By WILLIAM H. SPECK

"Power tends to corrupt and absolute power corrupts absolutely."

— Lord Acton

• Alexandria, Va.

Navy officials spend countless hours and incur much delay and cost seeking appropriations of funds, often to be disappointed, then look for means to "self-finance" necessary work. But the Constitution and statutes have been deliberately written to prevent self-financing, partly for historical reasons and partly for present jealousies of authority.

The Constitution forbids the Treasury to pay out moneys without an appropriation by law, and the U. S. Code requires that an appropriation be in specific terms. The Constitution forbids Army appropriations for longer than two years but does not so limit Navy appropriations.

These limitations may be traced to the English 17th Century Civil War, when only the necessity to go back to parliament for taxes and moneys prevented James I and Charles I from exercising tyranny without restraints from elected representatives. The Army, being close on land was more feared than the Navy.

From this history come the Constitutional restraints, and they continue as a means for Congress to control executive action by appropriations, usually year by year.

An obvious way around appropriation restraints is to sell Government property and use the returns for operations. But the Constitution provides that Congress makes the rules for disposal of Government property, interpreted to mean no disposal without statutory authority. Disposal statutes usually provide that all proceeds of disposal must be paid into the Treasury. And a long-time revised statute provides that all moneys received by Government officers be covered into the Treasury without reduction.

Congress, in many instances by express exception to these general rules, has permitted the direct use of money receipts from sales of property or services without deposit into the Treasury and an appropriation out. An example is the Military Leasing Act which permits taking as consideration the lessee's protection and maintenance of the whole property. Another authorizes the furnishing of utilities to those in the vicinity of military installations, with the proceeds deposited to the credit of the appropriation financing the service. Still another authorizes the sale of timber and use of the proceeds for financing conservation and production programs.

Temptations to find ways to use property or moneys for Navy purposes without going the tedious, frustrating appropriation route are enticing. Some means are justified and sanctioned by long use. The use of Navy sites for construction or as a source of fill or aggregate is such a use, not expressly authorized by statute, but justified. But a use found to go over the fine, discriminating line could result in a direction to pay an equivalent sum into Miscellaneous Receipts.

An Admiral, A Soldier and A Sword . . .

• Yokosuka, Japan

After a 29-year absence Tojiro Hashimoto's samurai sword was returned to him by Capt. Raymond A. Bafus, CEC, USN, commanding officer of the U.S. Naval Public Works Center.

Capt. Bafus presented the sword to Hashimoto at a ceremony held at the headquarters of the Japanese Red Cross Society in Tokyo.

Hashimoto smiled happily as he received the sword and said, "I feel like my son has come back to me after an absence of nearly 30 years."

The missing sword has quite a story behind it. The commander of a U.S. Navy construction battalion had disarmed Hashimoto, then a Japanese Army sergeant, in October 1945 on Minami Daito Island about 250 miles east of Okinawa.

The commander then sent the sword as a war relic to Admiral Ben Moreell, then the senior Civil Engineer Corps officer in the Navy, and founder of the "Seabees."

Upon retirement Adm. Moreell donated the sword to the Civil Engineer Corps-Seabee Museum in Port Hueneme, Calif., with the provision that it be returned to its owner if he could be found.

Adm. Moreell said in a letter to Hashimoto that he wanted to return the sword for many years, but had not been able to locate the rightful owner.

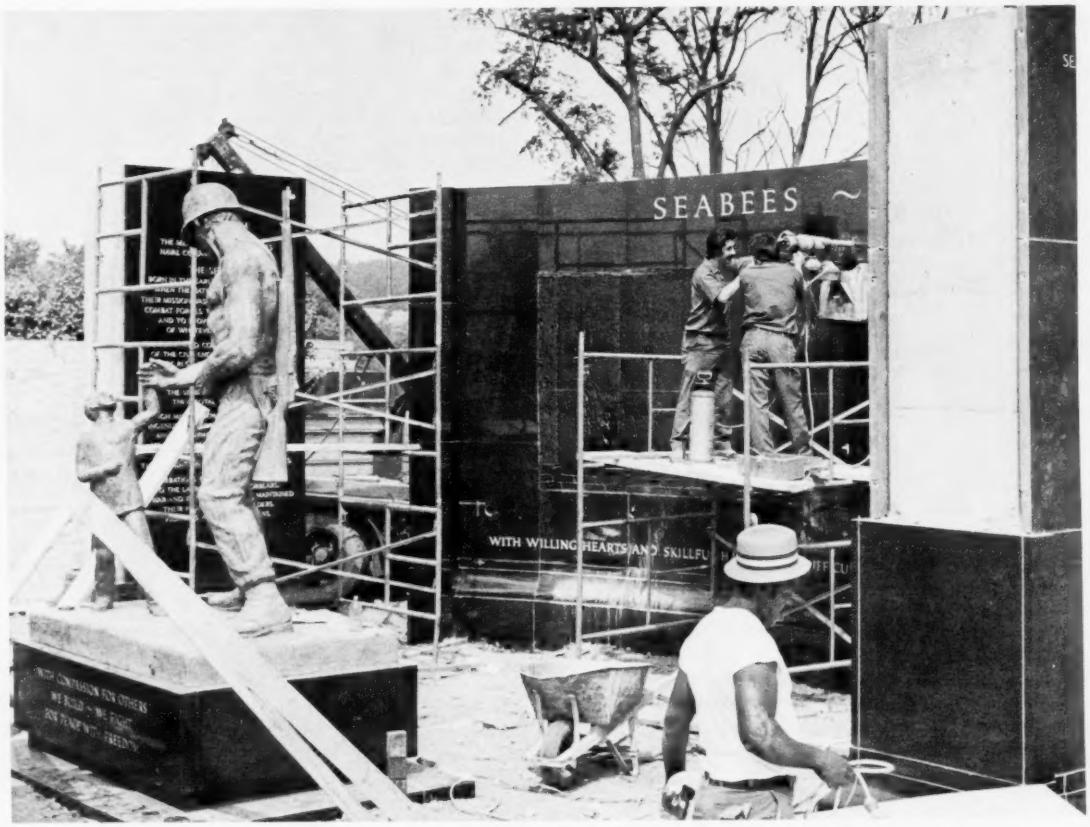
The admiral indicated that he was happy to be returning the sword to its rightful owner and said: "It is a fitting conclusion to my participation in the war between our two great nations. A war which, by right, should never have taken place."

The director of the Civil Engineer Corps-Seabee Museum at Port Hueneme, Hark Ketels, and the managing director of the Pearl Harbor Memorial Museum joined forces with the chief of the foreign affairs department of the Japanese Red Cross Society in locating Hashimoto, a resident of Hiroshima. The group finally succeeded in finding the owner by utilizing a small wooden tag which had been attached to the sword.

Adm. Moreell had requested Capt. Bafus to present the sword to Hashimoto because he is the senior Navy Civil Engineer Corps officer now in Japan.

CAPT. R. A. BAFUS, CEC, USN presents Tojiro Hashimoto his wartime samurai sword and a letter from ADM Ben Moreell. Ryutaro Azuma (center), director of the Japan Red Cross, witnessed the event.

Building A Memorial To The Navy's Builders



Construction workers completing the monument which will honor their military counterparts; the Navy Seabees.

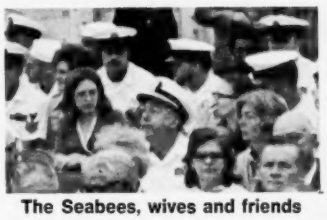
The Builders

RADM Reider and EQCM McCully

The persons responsible for the realization of the Seabee monument (which is located on Memorial Avenue leading to Arlington National Cemetery) number in the thousands by contributing to the Seabee Memorial Association. The plan was originated by Rear Admiral Walter M. Enger, CEC, USN (Ret) when he was Commander, Naval Facilities Engineering Command and Chief of Civil Engineers. The association, headed by Rear Admiral George Reider, CEC, USNR (Ret) raised the cost of the memorial and additional funds to permit a "living memorial" of scholarships for eligible daughters and sons of Seabees and CEC officers. Personifying Seabee participation in the fund raising is Master Chief Equipment Operator Johnny R. McCully, senior enlisted advisor to the commander of NAVFAC, who unveiled the memorial at the dedication ceremonies. The designer and sculptor of the commemorative was Felix de Weldon, whose other works include the Iwo Jima Marine Flag Raising monument located near The Pentagon.

RADM Enger

Felix de Weldon



The Seabees, wives and friends

The Principals

The Honorable J. William Middendorf, Secretary of the Navy, offered brief remarks during the dedication and read a letter from the President of the United States addressed to Admiral Ben Moreell, founder of the Seabees and principal speaker at the occasion. Master of ceremonies for the occasion was Rear Admiral A. R. Marschall, Commander, Naval Facilities Engineering Command and Chief of Civil Engineers.

The Honorable J. William Middendorf II, Secretary of the Navy; Rear Admiral A. R. Marschall, CEC, USN, Commander of the Naval Facilities Engineering Command and Chief of Civil Engineers and Admiral Ben Moreell USN(Ret) founder and World War II commander of the Seabees.

The Ceremony

PRESENTATION OF THE COLORS
Color Guard, Naval District of Washington

INVOCATION
Rear Admiral James W. Kelly, CHC, USN (Ret.)
Former Chief of Navy Chaplains

NATIONAL ANTHEM
The United States Navy Band

MASTER OF CEREMONIES
Rear Admiral Albert R. Marschall, CEC, U.S. Navy
Commander, Naval Facilities Engineering Command and Chief of Civil Engineers

PRESENTATION OF SEABEE MEMORIAL
Rear Admiral George Reider, CEC, USNR (Ret.)
President, Seabee Memorial Association

UNVEILING OF SEABEE MEMORIAL
Master Chief Petty Officer Johnny R. McCully,
Master Chief of the Seabees

INTRODUCTION OF SCULPTOR
Mr. Felix de Weldon

REMARKS
Honorable J. William Middendorf
Secretary of the Navy

DEDICATION ADDRESS
Admiral Ben Moreell, CEC, USN (Ret.)
Founder of the Seabees

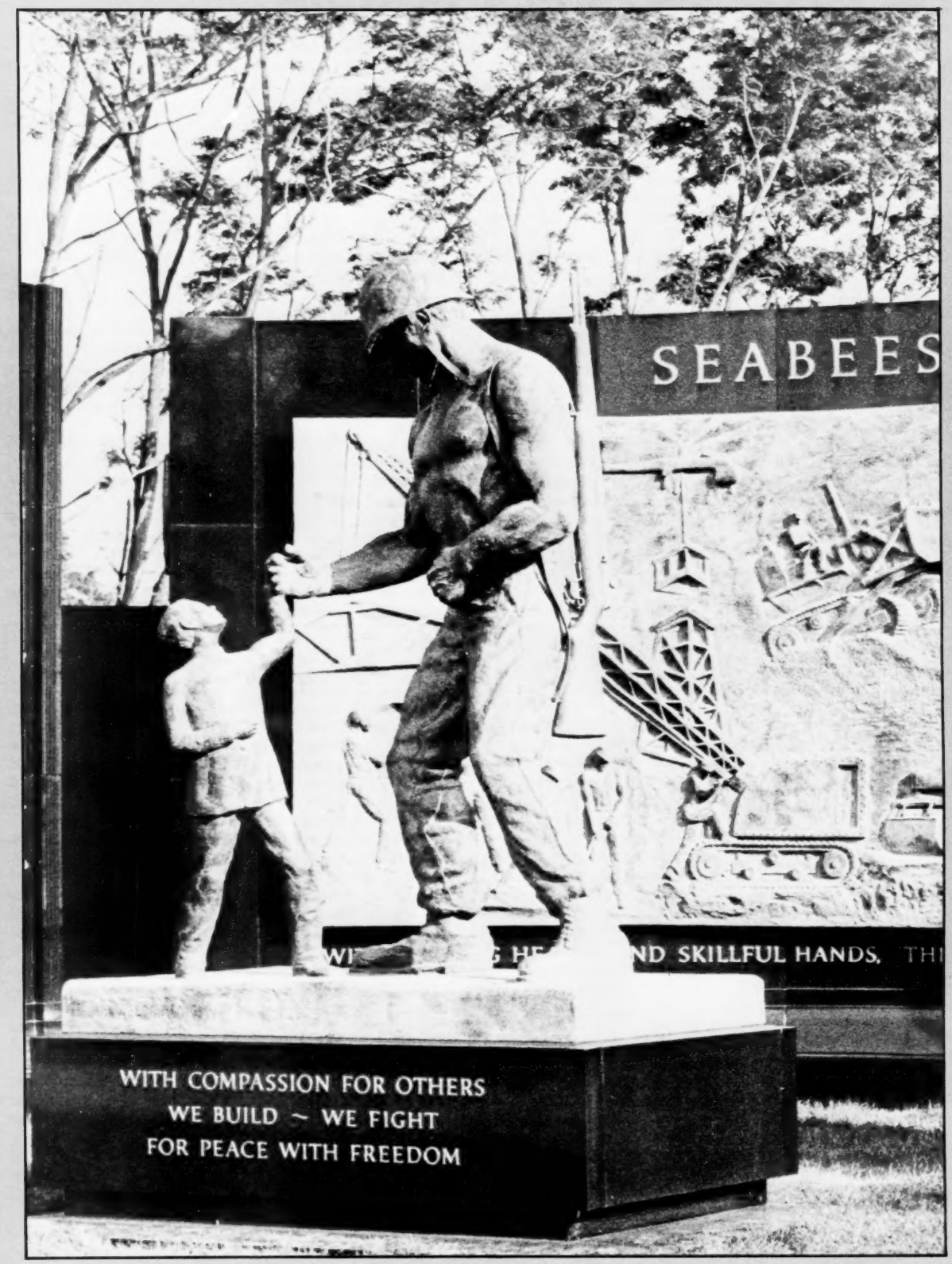
BENEDICTION
Rear Admiral Kelly

Distinguished Guests

Admiral Isaac C. Kidd, Jr., Chief of Navy Material (center) pays respect to Admiral Moreell, (left) following dedication ceremonies in which Admiral Moreell was featured speaker.

The new chief of Naval Operations, Admiral James L. Holloway III (left) visits with Admiral Moreell and Rear Admiral James W. Kelly (center) retired Chief of Chaplains, U. S. Navy.

A moment of reflection is observed during benediction at the dedicatory event by Marine and Navy comrades-in-arms and Seabee friends and relatives.


SEABEES
ND SKILLFUL HANDS.
WITH COMPASSION FOR OTHERS
WE BUILD ~ WE FIGHT
FOR PEACE WITH FREEDOM

16 years and $17.4 million

By DIANA BARNETT
Public Affairs Officer, Atlantic Division

• Norfolk, Va.

Earlier this year a formal ceremony at the Atlantic Division, Naval Facilities Engineering Command, marked one of the most significant real estate purchases in the history of the city of Norfolk. The land acquisition had spanned many years of study and negotiation and the formal closing ceremony documented the fact that the Navy had finally acquired 494.8 acres of land at Sewells Point from the Norfolk and Western Railway Company for a purchase price of $17.4 million.

The lengthy acquisition project began in the late 1950s when it was concluded that the Sewells Point Naval Complex, landlocked since World War II, must be expanded to meet future requirements. The acquisition of lands belonging to Norfolk and Western Railway Company was the only feasible solution. From that point the task of selling the proposal to local commands and higher authorities began. All aspects of the expansion plan had to be precisely justified, such as the need for extending the Naval Air Station runways to the west into the Norfolk and Western property rather than other directions.

In February 1963 the Chief of Naval Operations confirmed the requirement for the land, and in July 1965 approved acquisition of the property and authorized formal discussions with the Norfolk and Western officials..

Additional information was developed, and the project requirements were fine-tuned for delivery in briefings to other commands and for possible use in Congressional hearings.

Congress authorized the acquisition of the land in November 1971 and the purchase agreement with railroad officials was signed in September 1972.

In August 1973 (by special agreement with Norfolk and Western) the Navy began the first construction on the property. Ground was broken for a cold storage warehouse to be operated by the Naval Supply Center. The second groundbreaking on the property took place in February 1974 for a new Navy Exchange warehouse.

Additional projects slated for construction on the land include: a container stuffing and stripping plant, an open storage area, a household goods shipping facility, a 1,600-foot extension of Runway #10 at the Naval Air Station, a new freight and passenger air terminal, two berthing piers, and a new dispensary.

Even though the acquisition of the property can be so simply summed up in a few brief paragraphs — it was not quite so simple a process. From its genesis there were innumerable complex problems to be solved by LANTDIV's facilities planning and real estate departments and the legal staff.

All acquisition documents have now been signed and checks representing the millions of dollars have passed across the table — but the work goes on for the Atlantic Division, NAVFAC, and the Navy, who is now the landlord of the property and the existing leaseholds. The existing leaseholds will eventually be purchased by the Navy and the remaining phases of the extensive construction program will begin.

So, 16 years of acquisition have ended, and years of construction now begin.

Microfiche

By H. HANBACK,
Director
Documentation Division, NAVFAC

• Alexandria, Va.

The paper shortage, long lead times for printing, and the lack of clerical personnel, have emphasized the need for a quicker, more economical method of disseminating necessary technical and administrative information.

Since 1958, NAVFAC has gradually used the microform approach for vital records and communications. The 105mm micromaster system for architectural and engineering drawings provided a simple, high quality and reliable system. There are now several million significant drawings retained on 105mm. The same basic approach must be used in the publishing and retention of other vital documents.

Surveys have shown that the standard, traditional 8" x 10½" bound book takes approximately nine months to produce and is difficult to use at desks, conferences or during travel. Lack of clerical support has delayed inserting changes in the manuals and the space required to house the collections on shelves is at a premium.

Consequently, NAVFAC will soon begin publishing manuals and related documents on microfiche. Each field office will receive cut sheets of film, 105mm in size, capable of carrying 96 reduced pages. The normal manual will be contained on two sheets of film. The cost of a master silver negative will be between $1.80 and $2.50. The cost of a diazo duplicate is just .075 cents for a regular fiche, and slightly higher for 48x systems. It is planned that by the end of 1975 each field office will have a complete file of all NAVFAC publications on microfiche.

These files will be issued from HQNAVFAC. Each field office will by then have a microfiche reader/printer with a 24x and 48x lens so that computer printouts reduced 48x and publications reduced 24x can both be read and a copy made when required.

When an absolute requirement for a copy in book form is required the local Navy Publications and Printing Office can supply them economically and in short time. The hard copy can be produced two pages on one sheet of paper, normal book style or one-to-one if absolutely required.)

Change pages will be shot onto the microfiche negative and issued to the field properly placed in the text sequence. When a revised microfiche film is received, the original film should be destroyed and immediately replaced with the revised film placed in file. This will insure each field office with an undated master file within twenty days of the release of the material from headquarters. This system eliminates doubt concerning whether the field has the latest change. Two copies of the microfiche will be sent to each activity, one to be maintained in the master file and one copy to be used for viewing and reproduction as required. The entire library of NAVFAC publications will fit into two standard size file drawers.

The most significant advantages of the microform system are: faster communication with the field, 20 days in lieu of 9 months; complete and current data on hand; lower costs; and elimination of thousands of pieces of hard copy.

The user makes a hard copy only when a real need exists and destroys it when the need is satisfied, since the film file gives him the security of knowing that the data is readily available.

By 1976 it is anticipated that NAVFAC manuals and documents will, as will most of the Navy, material be completely on microfiche.

Naval Facilities Engineering Command
SITUATION REPORT

REPAIRS AND JACKING OPERATIONS OF 1200 FT. VLF ANTENNA (TOWER #10), NRS, ANNAPOLIS, MARYLAND -- On May 7 and 8, 1974, the Naval Facilities Engineering Command completed a tower operation which was performed for the first time in the history of tower erection. It included: the unique detensioning of guy wires and subsequent repairs by welding; jacking-up of the 1200-foot tower and installation of a new insulator system.

MULTIPLE DRY-DOCKING OF NUCLEAR SUBMARINES -- At the request of NAVSHIPS and the Supervisor of Shipbuilding, Pascagoula, NAVFAC investigated and subsequently concurred in the unique, simultaneous drydocking of two nuclear submarines in one drydock. The submarines USS HADDO (SSN 604) and USS TUNNY (SSN 682) were successfully drydocked in Ingalls graving dock at Pascagoula, Mississippi.

UPDATE OF DIESEL POWER PLANT CRITERIA -- Diesel-Electric Powerplant Definitives and Specifications have been revised to reflect current state of art increases in engine speed and power outputs. Allowable engine speeds for continuous standby and emergency plants have increased an average of 30% and allowable pressures, such as, cylinder brake mean effective pressure and firing pressure have increased an average of 25%. This would mean a 55% increase in output compared to same size diesel engine allowed 15 years ago. The space that a 500 kw diesel occupied 15 years ago, will now accommodate an 800 kw unit.

ENERGY CONSERVATION DESIGN CRITERIA AND INSTRUCTION COURSES - - NAVFAC recently let a contract to study and update present energy conservation design criteria for new and existing buildings. Design manuals, devoted exclusively to energy conservation, will be prepared for use by architects and engineers. A training course is also being prepared which will bring NAVFAC engineers "up to speed" on this subject and instruct them in the use of the manuals. Computer analysis will be utilized to determine the most cost effective energy saving designs.

Naval Facilities Engineering Command

SITUATION REPORT

NAVY'S OILY WASTES HANDLING AND DISPOSAL PROGRAM -- The Naval Facilities Engineering Command is conducting a survey and analyses of oily waste handling and disposal requirements at naval facilities both home and abroad. Where significant oily waste volumes are found, alternative disposal methods will be evaluated to determine the most cost effective method.

COMPUTER ENERGY CONSERVATION -- A computer program for analysis of the energy consumption of buildings will be made available to NAVFAC EFD's this fall. Energy consumption is calculated by an accurate thermal analysis technique using U. S. Weather Bureau data tapes rather than the usual approximate degree day method. The program analyzes alternatives to optimize the building system design. Proper use of this computer program will reduce energy consumption of new buildings by at least 20%. For a 100,000 sq. ft. office building this would amount to an energy saving equivalent to 40,000 gallons of oil annually. A five day training course is required for experienced mechanical engineers to properly use the program.

NAVFAC DESIGN CRITERIA FOR DOMESTIC HOT WATER BEING REVISED -- Updated design criteria governing the sizing and the selection of domestic water heating equipment is being developed by NAVFAC. The revised criteria will include standards governing the size of water heaters for Recruit and Regular BEQs; this criteria was recently developed as a result of field tests conducted by the Civil Engineering Laboratory. Also, the updated criteria will provide design guidance as it relates to the hot water requirements of other facilities peculiar to the Navy; otherwise the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) criteria, where considered adequate will be adopted.

STUDY OF ECONOMIC FEASIBILITY OF RECLAIMING ENERGY FROM SOLID WASTES -- Studies are being conducted at six major naval activities and one Marine Corps station to determine the economic feasibility of reclaiming waste heat from solid wastes by incineration or by burning in existing boilers. These municipal type wastes, presently going to landfill, are a potential source of energy which, if reclaimed, could reduce substantially the consumption of fossil fuels. Results of the first study at the Philadelphia Shipyard confirmed the high fuel value of the solid wastes. A benefit to cost ratio of over 3 can be realized by processing and burning solid wastes in the existing Navy boilers at the Philadelphia Shipyard.

NAVFAC COMPUTERIZED SPEC SYSTEM PROGRESSING -- Currently, NAVFAC has 116 guide specs (2033 pages) now loaded on computer. Two project specs have already been prepared using the system. Terminals are expected to be installed in all EFDs by September 1974.

RUNWAY FRICTION MEASUREMENT PROCEDURES -- NAVFAC is initiating improved runway friction measurement procedures during FY-75 in an effort to detect and report potential for aircraft hydroplaning. Measurements will be conducted with the "Mu-Meter" skid testing trailer on wet and rubber-coated runways. Results of the measurements, with appraisal, will be reported to Air Operations personnel. During the initial year, measurements will be conducted at 17 Naval and Marine Corps runways. Additional activities will be scheduled for subsequent years.

HUNTERS POINT NAVAL SHIPYARD (STANDBY STATUS), SAN FRANCISCO -- To assist the Department of Commerce in efforts to increase the supply of ferrous scrap on the domestic market, the Navy has awarded to Pacific Industrial Marine, Inc., the high bidder, an outlease covering 13 acres of land, Pier #2, and railroad trackage at Hunters Point for use in reducing to scrap obsolete Navy and Maritime Administration ships. In addition to assisting in the relief of scrap shortages, the lease will provide a cash rental to the Government at a rate of $210,000 per year.

NAVY AQUEDUCT, KEY WEST, FLORIDA -- As a result of recent Navy Shore Establishment Realignment actions, which reduced the mission of the naval complex at Key West, negotiations are underway by the Navy and the Florida Keys Aqueduct Authority (FKAA) for the transfer of the Navy Aqueduct to FKAA. Built in 1942, the aqueduct is a main source of potable water for the Key West military and civilian community. It stretches 130 miles from Florida City on the mainland to Key West.

FACILITIES PROJECTS MANUAL -- The Facilities Projects Manual (OPNAVINST 11010.20C) was signed on 30 May 1974. Major impact is in the area of project review by EFDs. Activity COs will be responsible for certification of technical adequacy of projects. Major claimant is responsible for selection and funding and is expected to be more involved in program. EFDs will be available for assistance, if requested, but generally will not be involved until funds are provided for project accomplishment. General distribution of the manual is anticipated in early October.

Naval Facilities Engineering Command
SITUATION REPORT

SHORE FACILITY PLANNING FACTOR CRITERIA UNDER DEVELOPMENT FOR SEABEES -- The Naval Facilities Engineering Command has been requested by CBLANT to develop planning factor criteria for those NMCBs deployed in a peacetime mode, at such locations as USNS Roosevelt Roads, and USNS Rota, Spain. The development of this criteria is the first phase in a comprehensive plan by CBLANT to upgrade facilities for deployed NMCBs. A standards and criteria development team from NAVFAC has visited CBLANT and Roosevelt Roads. The visits have provided the team with valuable, first hand data.

TRIDENT -- Although design is underway on 19 projects with construction estimates totaling over $123,000,000, a great deal of OICC TRIDENT's efforts throughout the spring and summer have continued to be devoted to complying with the National Environmental Policy Act. Captain E. R. Stacey, CEC, USN, OICC TRIDENT, acted as hearing officer at a public hearing on the Draft Environmental Impact Statement (EIS). The hearing was held in the town of Silverdale, Washington on 24 and 25 April, and attendance was estimated to be in excess of 800. The Draft EIS also generated some 1200 pages of written comments. The final EIS, which incorporates and responds to the public comments, was filed in July. After a 30 day waiting period the first construction projects at the Bangor site will be advertised. During this same period the OICC TRIDENT staff moved from its temporary location on Bangor Annex to leased office space in Bremerton, Washington.

FAMILY HOUSING AWARDS -- The Navy has awarded to date, under the Fiscal Year 1974 Family Housing Authorization Act, 2,480 Navy units and 800 Air Force units since January 1974, worth a total of $67,738,000 and $23,659,000 respectively. It is anticipated that an additional 1,645 Navy units worth $51,000,000 will be awarded during July and August of this year. Navy owes much of its success to its expertise in the use of one-step "Turnkey" negotiated procurement procedures which was first initiated in 1968. The other military services have since adopted the Navy's "Turnkey" system in whole or in part and their experience has also been in many instances successful.

FIRST RNCB CONFERENCE -- The Reserve Naval Construction Brigade held its annual conference in Port Hueneme, 27-30 June 1974. Major topics of discussion included the Brigade's objectives and goals for the upcoming year and the current restructuring of the Naval Reserve.

PROGRESS REPORTS BY VIDEOTAPE

By LTJG DONALD C. ALLEN, JR.
Assistant Acquisition Coordination Officer
Atlantic Division, NAVFAC

• Norfolk, Va.

The construction of a naval communication station on the island of Diego Garcia located in the British Indian Ocean territory (BIOT) has presented the NAVFAC family with unique experiences. From these, several innovative ideas and techniques have evolved.

One of the most simple, yet useful, developments is the expanded use of video products. The use of visual records for construction is not new. Movies, slides, still pictures and video tapes have been used before. However, their use at Diego Garcia has played an especially important role. Foremost among the techniques used has been that of video tape recordings.

From the day in March 1971, when the main body of the Seabee construction force first arrived on the island to begin work, a video tape recorder has been there to capture the story. Monthly, the resident officer in charge of construction (ROICC) has toured the island recording the progress of construction. Additionally, significant events, peculiar problems, unique solutions and construction modifications have been recorded both for resolution by others and for simply the sake of interest. These tapes, when all together, form a permanent record, the history of construction at the Diego Garcia Naval Communication Station.

The monthly progress of construction video tapes serve several purposes. After recording both visual and audio portions of a tape, the ROICC sends it to the command of the principal using activity, the Naval Telecommunications Command, who reproduces another copy which is forwarded to the Atlantic Division of the Naval Facilities Engineering Command. At both commands, key personnel are able, by viewing the tape, to get an updated status of the project which is far more meaningful than percentages, descriptions or figures relating the dollar value of work in place. Because of these tapes, time and money was saved as fewer site visits by these commands were required.

On the working level, project coordinators are able to better comprehend just what is happening on each facility. From the information gained, they are enabled to better plan future activities, schedule material procurement and shipment, modify current areas of emphasis and resolve existing problems.

Periodically, a situation will come up on site which will be beyond the expertise of the ROICC and his staff. The ROICC will record the problem utilizing the video tape recording equipment and forward it to the Atlantic engineering field division for resolution. With the visual and audio facts presented the design engineer, the problem is more readily identified for a more accurate assessment and solution which is then returned to the ROICC for action.

On other occasions, when field modifications are made, the ROICC has brought special attention to them in his monthly tapes so as to keep all concerned advised of the change. This is timely and valuable information for those working on related design changes which would be affected by the ROICC's field change.

Whenever aircraft was available, the ROICC would take his equipment to the air to record an overall view of the island, each facility, its status, and the relationships between them. These tapes served to indoctrinate people newly assigned to the project, provide planners with views of the island not normally seen for consideration in possible expansion plans and also to display the beauty and splendor of the tropical isle.

Another area which is just as important as problem solving and history recording, is the personal satisfaction each man has when he sees a finished product of his design. Many designers have spent endless hours over a drawing board on a project they knew they would never see. To be able to see the fruits of their efforts, can be most gratifying.

To produce these tapes and to view them, two sets of equipment are required. At the viewing end, there are two primary components. The first is a video corder, which looks similar to an ordinary reel-to-reel tape recorder. Its function is to convert electrical impulses or signals from the ROICC's tape to other tapes or to the second major component, the receiver/monitor television set. This resembles the 18-inch portable TV set. Here the signals are converted to a black and white image which appears on the TV screen, with sound as recorded by the ROICC.

At the recording end, in this case, Diego Garcia, there were three primary components. The first was a receiver/monitor television set similar to the one described for the ROICC to use to edit his work and to discus various portions with his civilian staff. The other two components do the recording and are used together in the field. They are completely portable, battery operated and can be carried and operated by one person. Consisting of a hand-held camera with a zoom lens (6 pounds) which is cable-connected to a shoulder—or back—carried videorecorder (19 pounds) for recording both the picture and sound, it also permits easy play back into the camera view finder or a receiver/monitor TV set for review on the site. Included in the package are tape reels, an AC power adapter for battery charging or recording using available house power and a microphone for adding sound either in the field or in the quiet of an office.

And finally, the cost of the entire system is low. The initial cost for the equipment used on the Diego Garcia project was less than $2,500. Subsequent costs for repair, additional field batteries and tapes have been minimal. If the project was to be completed this year, the average cost per year of the system would be less than $900. With each succeeding year that the equipment is used at Diego Garcia or any other construction site, the average cost per year will obviously drop.

In all, the use of video recording products has greatly enhanced the review, supervision, and quality of the new construction on Diego Garcia. Remoteness of Diego Garcia's location made the use of the system a necessity and from the experience and benefits derived, indicates that similar rewards could be reaped elsewhere.

NAVAL RESERVE

The Reorganization of the

By CDR THOMAS H. OSWALD, JR., CEC, USN
Reserve Programs Officer, NAVFAC

• Alexandria, Va.

In the spirit of the total force policy of the Secretary of Defense, the Naval Reserve is being completely restructured to conform with the organizational structure of the active Navy. After years of growth, with many changes which did not conform to the overall scheme of operation, the new structure will provide a more rational basis for the organization and administration of the Naval reserve.

In the old system, the most commonly known unit of the Naval Reserve was the Surface Division, which was simply a collection of reservists of all ranks, rates and ratings who happened to live in a given community. The Seabees were an exception to the system, since they were organized into all-Seabee divisions of Reserve Naval Mobile Construction Battalions, which were basically under the command and control of the naval district commandants.

Then in 1969 the 1st Reserve Naval Construction Brigade was established, and the Seabee battalions and regiments were pulled together under a central, nationwide reserve Seabee command. This organization for the Seabee reserves continues, unaffected by the restructuring discussed in this article.

Apart from the reserve Seabee organization, there have been over 2,000 CEC and Group VIII Naval reservists in various capacities including duty as public works officers of Naval reserve facilities, in attendance at Naval Reserve Officers School (NROS) and in a general support category previously known as training and support, but more recently as the Reserve Support Unit. Reservists in these programs were given individual mobilization assignments at regular Navy activities. However, their Naval reserve unit affiliation often bore no resemblance to their intended function under mobilization conditions.

Further, on a Navy-wide basis, there was no formal program structure to facilitate annual program planning and budgeting. The annual Naval reserve program request to the Congress consisted in general of a gross requirement for individual reservists and lacked the program definition which characterizes the active Navy program planning budget system.

The current restructuring was directed by the Chief of Naval Operations and is being executed by a Bureau of Personnel task group known as the Reserve Analytical Studies Project (RASP). Its primary objective is to completely orient the Naval reserve organization toward the mobilization requirements of the Navy and to structure the reserve almost wholly on a unit basis. The RASP group has worked for over two years in defining, justifying and implementing the new program structure. Final completion is expected by the end of FY-1974. An OPNAV Notice will promulgate the programs incrementally as they are developed. Upon final completion, the basic OPNAV and BUPERS Instructions now governing the Naval Reserve will be completely rewritten.

At the top of the new Naval reserve organization, effective 1 July 1974, is the billet of Chief of Naval Reserve (CNAVRES) headquartered at New Orleans. The three-star billet currently occupied by VAdm Damon W. Cooper (son to be relieved by VAdm-designate Pierre Charbonnet) commands both the air and surface components of the Naval reserve. The Commander, Naval Surface Reserve, has been relocated from Omaha, Nebr. to New Orleans with the title of Deputy CNAVRES for Surface. The Commander, Naval Air Reserve, was relocated from Glenview, Ill., to New Orleans as Deputy CNAVRES for Air.

The next echelon in the Naval Reserve organization is a completely new command level known as Naval Reserve Readiness Commanders. The continental United States was demographically analyzed by the RASP group; the distribution of the total Naval reserve population was examined against requirements such as availability of transportation to central drilling sites and other considerations, similar to those encompassed in regional market analyses. The result was a subdivision of the United States into 22 readiness command areas, some of which necessarily cross Naval district boundaries. Each Naval reserve readiness commander will report to the Chief of Naval Reserve in New Orleans through the Naval district commandant in whose district his headquarters is located. The readiness commander billets will be filled, insofar as possible, with inactive Naval reserve line flag officers, each with a Naval reserve staff. Certain of the readiness commands will be headed up by active duty USNR captains with identical staffs. The primary function of these readiness commanders will be to command, administer and train the Naval reserve units developing under the new system. The Readiness Commanders also will command the Naval reserve facilities in their respective areas.

As mentioned above, the 1st Reserve Naval Construction Brigade remains independant of the district commandant readiness commander chain of command. The brigade commander continues to report directly to the Chief of Naval Reserve, and the nine regiments and 18 battalions (to be reduced to 17 in FY-75) report to the brigade commander in the normal military chain of command.

The Naval reserve restructuring has brought about the organization, for the first time, of units whose mobilization missions are with the various headquarters and field activities of NAVFAC. A new program, known as the Reserve Naval Facilities Engineering Program, will incorporate these NAVFAC augmentation units into the system. Initially, 46 units are planned for establishment and activation to provide the major source of mobilization

Continued from preceding page

manpower for active NAVFAC activities. Specialized units, each with a specific personnel allowance of drill-pay billets, are being formed to augment NAVFAC headquarters, engineering field divisions, public works centers and OICCs. These units will be under the respective Readiness Commanders and thus will be organizationally separate from the reserve Seabee brigade. It is planned, however, that the second reserve CEC flag officer (RAdm-select Robert C. Esterbrooks) will be designated as Director, Reserve Naval Facilities Engineering Program, and will function in a general "monitor and assist" capacity under the Chief of Naval Reserve in overseeing this portion of NAVFAC's program responsibilities.

The training of NAVFAC augmentation units will be accomplished at their required monthly drills and during their annual two weeks active duty for training. Training programs currently are being developed by the reserve programs office at NAVFAC headquarters in conjunction with the Chief of Naval Reserve staff and with assistance by the Civil Engineer Corps Officers School. It is anticipated that the reserve units will be provided as much training as possible by their assigned "parent" (mobilization) activities. Specific guidance is being issued to NAVFAC activities by the Commander, Naval Facilities Engineering Command.

The restructuring of the Naval reserve represents a quantum improvement in the organization and management of this vital component of our national defense force. Its implementation is essential to the premise of the total force policy, which is that, in the absence of a military draft, the guard and reserve will be relied upon as the initial and primary source of augmentation of the active forces in any future emergency.

Navy Natural Resources Awards

• Alexandria, Va.

Two Navy and two Marine Corps installations have been selected as the winners of the Department of the Navy Natural Resources Conservation Program by a panel of nationally prominent conservationists. The four installations, selected from among 19 nominations, will receive awards for their outstanding conservation efforts during calendar year 1973. Competition for the award is divided into two classes — installations consisting of over 5,000 acres and those with 5,000 acres or less.

Navy winner in the *over* 5,000 *acre category* was the Naval Ammunition Depot, Crane, Ind. In the 5,000 *acres and under* category, the winner was the Naval Weapons Laboratory, Dahlgren, Va.

First place winner in the Marine Corps in the *over* 5,000 *acre category* was the Marine Corps Base, Camp Pendleton, Calif. In the 5,000 acres or less category, the winner was the Marine Corps Air Station, Kaneohe Bay, Hawaii.

Second place winners in the over 5,000 acre category were: Naval Air Station, Meridian, Miss., and Marine Corps Base, Camp Lejeune, N.C. In the 5,000 acre and under category the second place winners were: Naval Air Station, Chase Field, Beeville, Tex., and the Marine Corps Supply Center, Albany, Ga.

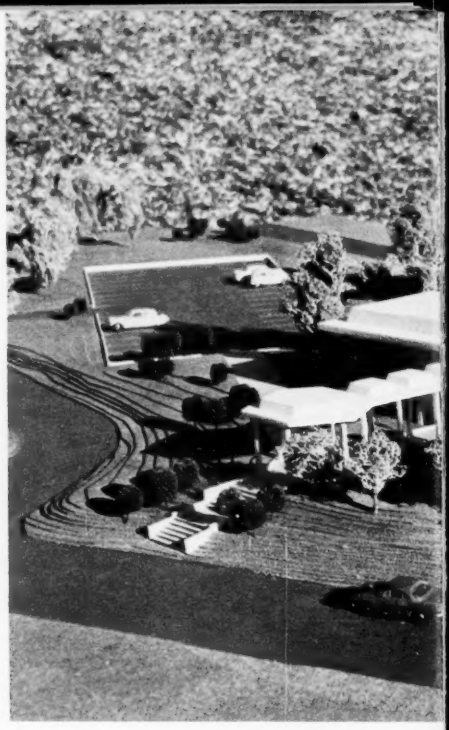
Criteria for the Natural Resources Conservation Award included forestry operations, fish and wildlife management, soil and water conservation, and other improvements to the quality of the environment. Community relations, conservation education, development of outdoor recreation areas, and conservation club activities were also factors that were considered.

Convened at the invitation of Rear Admiral A. R. Marschall, CEC, USN, Commander, Naval Facilities Engineering Command, the panel of judges noted that they were impressed by the totality of some of the programs in terms of sound ecological housekeeping, including noise pollution control in some cases. The judges also stated they were, "particularly impressed by the comprehensiveness of the (NAD) Crane forest conservation plans and its contribution to the entire community and, that although decidedly different in nature, the Kaneohe program impressed the committee no less — especially in its enthusiastic total involvement. Both are doing their utmost in terms of geography and the resoure challenge posed."

The judges unanimously further recommended that the Crane, Indiana, Naval Ammunition Depot, and the Marine Corps Air Station at Kaneohe Bay, Hawaii, be submitted as candidates for the Secretary of Defense Conservation Award.

A MOSQUE FOR MOROCCO

By LCDR ALLEN J. STEWART, CEC, USN
Naval Post Graduate School

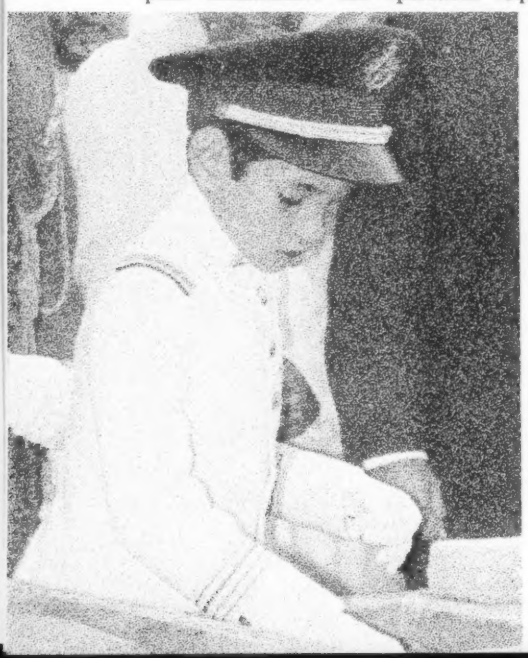


Model of the mosque designed for the • Kinetra, Morocco

Situated in the northwestern corner of the African continent, Morocco is a nation composed of many different racial and ethnic groups. The Arabs and Berbers are the largest segment of the population and their culture is dominant in the more accessible regions of Morocco. The Arabs and the majority of Berbers, which comprise approximately 90 percent of the total population, are of the Moslem faith.

The U. S. Navy's role in Morocco dates back to 1942 when General Patton's amphibious force stormed ashore in the first Allied landing of World War II which ultimately led to victory in North Africa. The French airfield and wharf facilities at Port Lyautey (now known as Kinetra), were utilized by the U. S. Navy during the Second World War to provide logistic support to the Mediterranean's Sixth Fleet. This 3,500-acre base, formerly the Navy's largest in Europe/Africa, is now a Royal Moroccan Military Air Base on which the U. S. Naval Training Command is situated to provide communications equipment maintenance and training in building trades to Moroccan military personnel.

The public works department at the U. S. Naval Training Command in Morocco, satisfies not only the physical plant maintenance and operations requirements of that command, but also provides similar services to the host, the 3eme Base Arienne, Forces Royales Air (the Third Royal Moroccan Air Force Base), at Kinetra.



The Moroccan Crown Prince Sidi Mohammed lays the mosque's cornerstone — May 1973.

What started as a request for architectural and planning assistance for a family housing project for Moroccan military personnel ultimately led to a most intriguing and challenging project . . . that of designing an Islamic mosque.

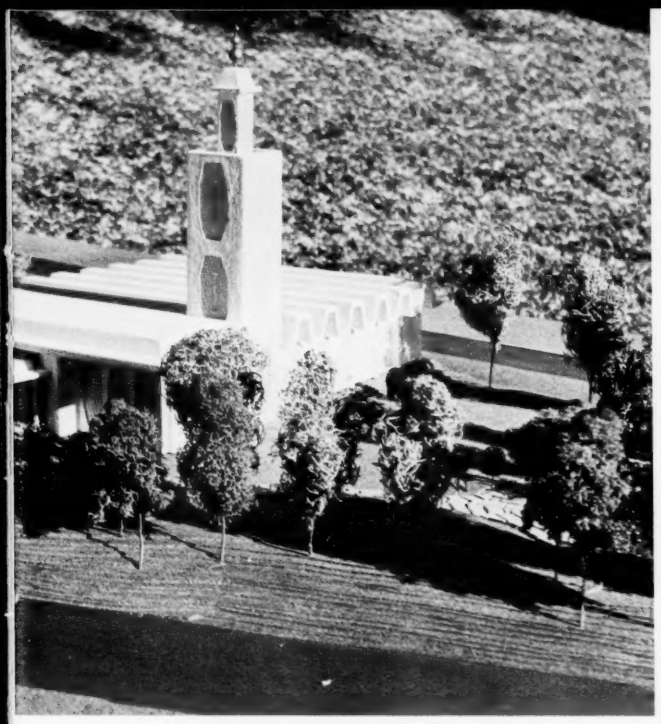
The Moroccan base commander had announced plans to construct 100 housing units for Moroccan military families. Labor was to be supplied by a *"Genie* Battalion" force and material funds were made available by the Moroccan Ministry of Defense. The Moroccan Army has several of these construction entities called *"Genies"*. These are roughly comparable in size to U. S. Naval Construction Battalions and are normally engaged in national public works projects such as airfield, road and bridge building.

Planning, architectural and engineering support were requested from the U. S. Navy in addition to funds for the installation of utility and street systems. Three hundred thousand dollars in excess foreign currency was authorized for the latter, and design work was undertaken in-house by the public works department.

Housing construction began in late 1971 by *Genie* forces, and contracts for utility and road systems were concomitantly awarded through the Navy's ROICC office. Shortly after the building program was launched, Morocco's reigning monarch, H.M. Hassan II, recognizing a need for a sanctuary in which to hold daily religious services for his people, provided funds for construction of a mosque.

The public works officer was asked by the Moroccan base commander if he would accept the commission to design this edifice. As it provided a rare opportunity for an "infidel" to design a moslem religious structure, the answer was an immediate affirmative.

A "mosque" is a place of prayer for Moslems and the word means "a place of prostration" to God. The first mosque was built in Basra in what is now southeast Iraq



Royal Moroccan Military Base located at Kinetra.

(circa 635 AD) shortly after the death of Mohammed, the Arabian prophet and founder of the Moslem religion. It first was simply a rectangle marked on the ground and thought by historians to have been enclosed by a reed fence.

Architecturally, a mosque consists of an open area, generally roofed over, called the *maksoura* or prayer hall. It has a *mihreb*, a semi-circular prayer niche reserved for the *imam* who leads the prayer, which is traditionally oriented toward Mecca. At the right side of the *mihreb* is the *mimbar* or pulpit, and a seat at the top of the *mimbar* step is reserved for use by the *khatib* or preacher. In the early days of Islam, the rulers delivered political speeches from the mimbar.

A *minaret* is usually attached. The *minaret* in the earliest of mosques was a place on the roof used to call worshippers to prayer five times a day, but now is a tower (which may take various forms such as the thin circular spires in Turkey or the heavier square towers found in Moorish Spain), used by the *muezzin* or "crier" to proclaim the *azan* or call to worship. A fountain containing running water for ablution is required. Mats or carpets cover the floor.

The mosque differs from a Western church in many respects. Ceremonies and services connected with marriages and births are never performed in mosques. The rites that are an important and integral function of many churches, such as confession, penance and confirmation, do not exist in the mosques. Prayer is performed by bows and prostration and no chairs or seats exist. Men stand in rows behind the *imam* and follow his movements. Women sometimes may join in but they must use a separate space, or more often a separate mosque.

No statues, ritualistic objects or pictures are used. The only decorations permitted are inscriptions of Koranic verses and of the names of the prophet Mohammed and his companions. Music and singing are also not incorporated into the religious services conducted at the mosque; however, the *Koran* is often chanted by professionals. No discrimination is allowed; rich and poor, noble and humble people, all stand together in the same rows.

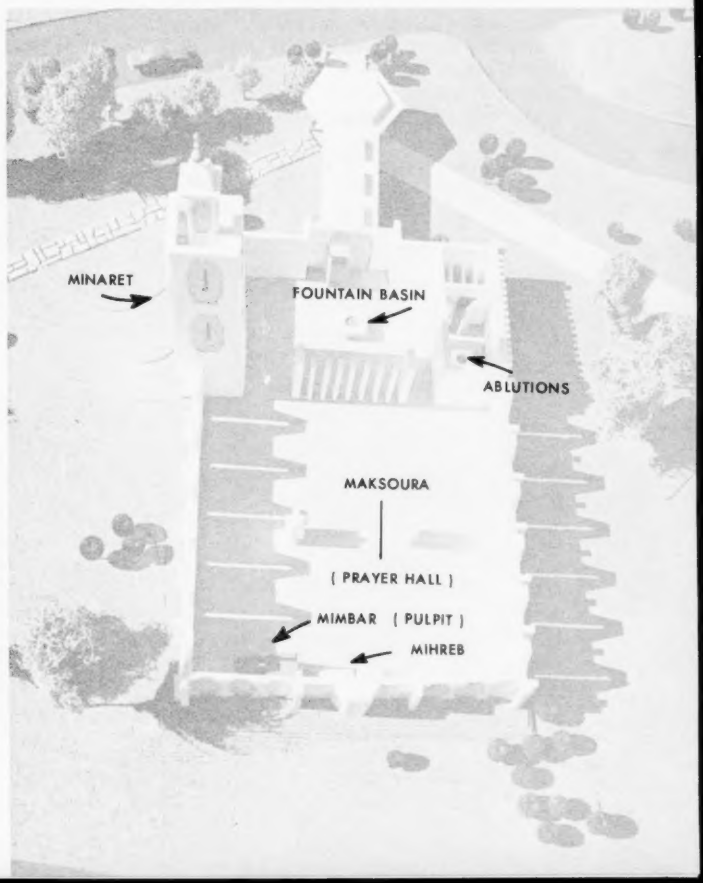
While mosques follow the same basic pattern of architecture, each country observes some inherent variations. In Morocco, for example, the minaret is square in plan, the required proportion being a four to one height to width ratio. While other basic proportions must be observed some latitude is given in plan form, roof, fenestration and facade treatment.

The commission for Kinetra's mosque set out only a basic scope of work. Budget was not a consideration, the capacity was set at 250 worshipers, but no other information was given. The size, site selection and design concept was left strictly to the architect. A fact that made the concept a matter of academic study was that in Morocco non-believers cannot enter a mosque.

Without such first-hand knowledge to be gained, it became necessary to study those architectural history references which establish basic forms, proportions, and requirements of religious expression which cannot be ignored.

Upon completion of the Mosque design and site development plans, a model was built for presentation to H. M. King Hassan II. The initial design concept for a 7,000 square-foot structure was approved and detailed drawings were prepared. The site was then leveled and dressed by Public Works Department Seabees who also brought the utilities to the area. The king's contractor commenced actual construction in March 1973. In a cornerstone laying ceremony on 14 May 1973, with the eleven-year-old Crown Prince Sidi Mohamed officiating, the mosque was dedicated. It is expected that the mosque will be completed this summer, in time to provide a place for prayer for occupants of new Moroccan military family housing units.

This project has been an exciting and rewarding experience of the Navy's people-to-people program.



Environmental Considerations In The Treatment Of Cooling Tower Water

By EUGENE SEVI, P.E.
Southern Division, NAVFAC

• Charleston, S.C.

Passage of the Federal Water Pollution Control Act Amendments of 1972 and the subsequent implementation of Federal regulations in 1973 have precipitated investigation into many types of pollutants and their sources not previously considered significant. One of these sources is cooling tower bleedoff water.

The American life style of today is characterized by conveniences and living, working and playing in a controlled environment. The convenience of comfort air conditioning has resulted in the typical Navy installation having numerous water cooling towers producing a significant liquid discharge.

Conventional treatment of towers for control of scale, corrosion and biological organisms involves the use of numerous chemicals which, when discharged in the cooling tower bleedoff water, make it a pollutant.

Water cooling towers became numerous as large refrigerated central air conditioning systems became commonplace. The drawing of the basic components of a cooling tower system shows that heat transfer occurs at two points: first, from the air conditioner condenser to the circulation water of the air conditioning system; and secondly, from the circulation water to the atmosphere as water evaporates from the cooling tower.

As the circulation water evaporates, the concentration of solids in the remaining cooling tower circulation water increases. The longer the system operates, the more concentrated the suspended solids in the circulation water become, unless part of the water is discharged from the system and makeup water is provided. Without such bleedoff, the solids concentration increases until an equilibrium develops in which the solids leaving the cooling tower with the windage loss equal the solids entering with the makeup water. In most cases, the result is a highly-concentrated circulation water producing severe scale conditions, restricting flow through the condenser tubes and resulting in lower efficiency and higher utility costs. In certain instances, excessively high dissolved solids cause galvanic corrosion.

Environmental Impact of Tower Treatment

To alleviate the scale problem, bleedoff water is discharged from the tower to decrease the amount of suspended solids remaining in the cooling tower system and to create an equilibrium where the solids concentration in the circulation water is stable and scale will be less likely to form.

However, adjusting the bleedoff rate alone is not enough to assure maintenance of a clean cooling system. The circulation water in open tower systems is always saturated with oxygen, creating a corrosion problem. Weather conditions can also affect the dissolved solids equilibrium; for instance, cooling towers are often exposed to sunlight, resulting in algae and other biological growths which can restrict water flow through the system. To prevent this, the system must be chemically treated.

Phosphate dianodic and the modified zinc dianodic treatment have become standard for scale and corrosion control. The problem of eutrophication by phosphates has been well documented and may be a problem in some areas. Some states are considering a possible standard limitation of phosphorous.

Sodium pentachlorophenate, which until recently was available through the Federal supply system, was widely used to control biological growths in cooling towers. This compound is a very effective biocide when used in high concentrations, but it is also toxic, with an ability to cause tainting of fish even in low concentrations of phenol.

Chlorine and quaternary ammonia compounds are also widely used as biocides in cooling towers. Chlorine alone in limited concentration had not, until recently, been considered a pollution problem; however, it is now receiving more attention as a possible pollutant. Some quaternary ammonia compounds contain mercury and copper compounds and, therefore, may be problems, especially since they are generally used as shock treatments. The use of mercury has virtually been eliminated, and some states are considering a possible limited standard on total nitrogen.

The new National Pollution Discharge Elimination System (NPDES) guidelines issued by the Environmental Protection Agency (EPA) recognizes the adverse impact of certain cooling tower treatments upon the environment, especially where large numbers of towers exist, such as on Navy installations. In most instances, a NPDES permit application for each cooling tower discharge has had to be submitted to EPA.

Evaluation at Naval Activities

Nineteen Naval activities in the southern United States were queried about the types of problems encountered and present treatment methods used in their cooling tower systems. Samples of makeup and bleedoff water were taken from 25 towers at these activities. Each sample was chemically analyzed with respect to scale-formation and corrosion properties.

Of the activities surveyed, three contract for their cooling tower treatment, 14 do their own treatment and two provide no treatment. The contracted treatment includes tower cleaning and control of scale, corrosion and algae. Of the 14 activities that do their own treatment, 13 treat for algae control and six also provide scale and corrosion control.

Most of the makeup waters chemically analyzed ranged between mildly corrosive and mildly scale-forming. The bleedoff waters indicated a tendency toward more of a scale forming condition, which is expected due to the increased concentration of the circulation water.

Proper cooling tower operation requires control of the solids concentration and the feeding of chemical additives to control scale, corrosion and algae.

The chemical tests showed that three samples had hexavalent chromium concentrations in a range indicating that chromate treatment was being practiced; the corresponding total chromium concentrations were slightly higher. Discharges of these concentrations of chromium are signifi-

cant pollution sources when considering the number of cooling towers at a Navy installation.

The heavier concentrations of copper and zinc in the samples of a few activities indicated that zinc dianodic treatment was being used. The levels of copper indicated that the use of the standard copper sulfate algaecide still continues. All of the samples analyzed had minimal phenol concentrations, indicating little or no use of phenolic based biocides.

The distribution of nitrogen and phosphorous, nutrients that can cause excessive biological growths in receiving waters, was investigated. All nitrogen concentrations were minimal, indicating no potential for contamination. Of the 25 cooling towers sampled, 23 had phosphorous concentrations at levels indicating possible use of quaternary ammonia biocides and the use of the phosphate dianodic treatment or phosphate treatment makeup water. These concentrations of nutrients may cause problems in the future.

The pH analysis of the sample cooling tower bleedoff waters showed all but two were within the acceptable pH range of 6.0 to 9.0. The two exceptions were only slightly above 9.0.

Control of Cooling Tower Discharges

Review of all of the bleedoff water analyses reveals that there are constituents commonly used in cooling tower treatment which are, or may be, polluting the water. The bleedoff waters differed from the makeup water in that the dissolved solids were three to four times more concentrated and some chemicals had been added for control of scale, corrosion and algae.

The questionnaire in general shows the activities were using proprietary treatment compounds, and many were not aware of the chemical constituents in the compounds.

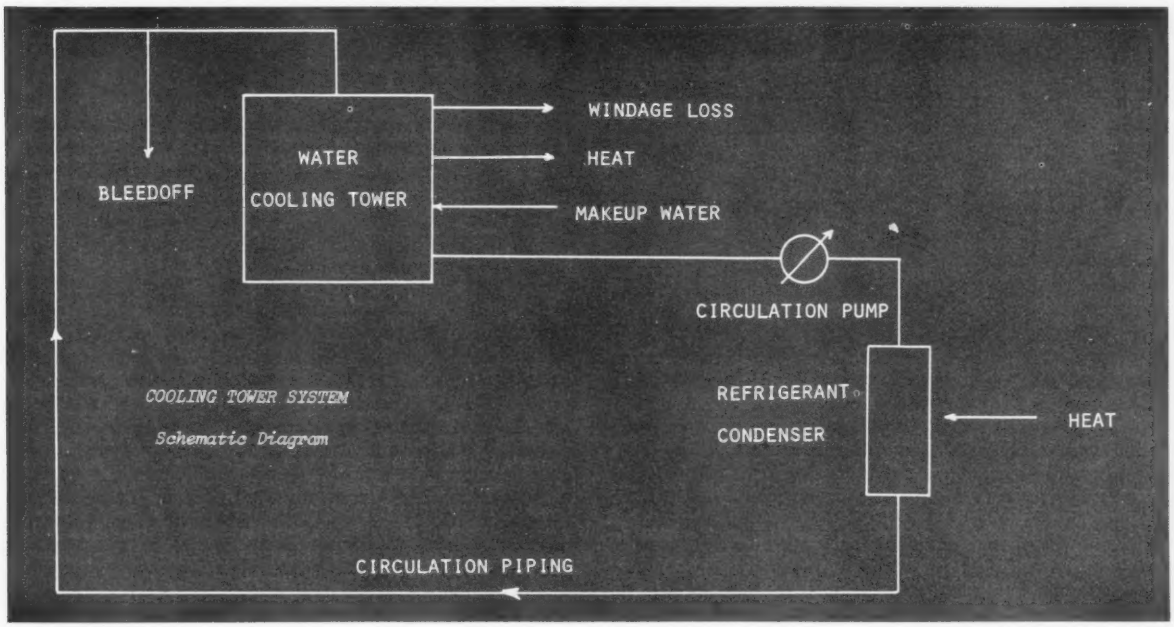
Probably the simplest solution to controlling cooling tower bleedoff discharges is connection to the sanitary sewer, a practice presently recommended as an alternative by the EPA. The primary considerations in using this alternative are hydraulics, dilution and toxicity to the treatment plant. Bleedoff waters from all the cooling towers on a particular station may constitute a major hydraulic load on the collection and treatment works and may take up capacity reserved for future domestic sewage. The bleedoff water is generally low in biochemical oxygen demand, which, at high hydraulic flows, may reduce the biological mass loading on plant equipment to adversely affect treatment. Toxicity to the plant may result if deleterious bleedoff concentrations, particularly chromates, are excessive. Municipal ordinances generally assign a discharge limit for chromate. The other commonly used treatment chemicals should not create toxicity problems if connection to the sanitary sewer is selected.

A possible alternative is conversion to air-cooled condensers. Many Navy activities are finding water cooling towers in a poor state of repair, possibly needing replacement or major overhaul. Replacement with air-cooled condensers should be considered. Although some efficiency loss and higher power costs may result, the need for makeup water, cooling-water treatment and subsequent bleedoff water treatment will be eliminated.

Should high-concentration chromate treatment of cooling water be desired, then treatment of bleedoff at the source should be considered. A number of package chromate reduction treatment units are available which would be more applicable to large towers in excess of 1000 tons. Ion exchange chromate removal units are available for smaller towers. Ion exchange can also remove copper and zinc and have the possibility for chromate recovery. The chromate reduction or removal units can produce an effluent sufficiently purified for discharge to storm sewers.

Modification to non-polluting treatment is becoming more common, since the water treatment chemical industry is perfecting non-pollution chemical treatments. Some of the new treatments available are organic compounds with various tracers such as zinc, chromate and polyphosphate added in low quantities for analysis purposes.

The alternatives in selecting cooling tower water bleedoff treatment methods, or converting to air-cooled condensers, are governed by both economics and operational considerations. Therefore, the services of an experienced industrial water consultant or sanitary engineer should be retained.



Is There Man
MAINTE
MANAGE

• Annapolis, Md.

Are we really managing maintenance?

Are managers today as smart as they used to be?

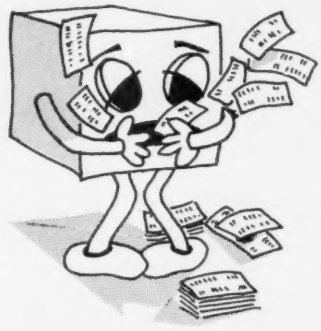
These questions were put to me the other day by one my employees and it caused me to stop and think. The two questions are certainly related and to answer one you have to answer the other. Our managers today *are* just as smart as prior ones but the problem is that *they are not managing as well as they should*. This brings up the question why? What factors are limiting the maintenance manager in managing well? There are possibly four major factors, which we will affectionately nickname as follows:

The Maintenance Management *Monster*
The Maintenance Management *Machine age*
The Maintenance Management *Monotony*
The Maintenance Management *Manacle*

Now — what is the definition of "managing"? Funk and Wagnall says that to manage is to control, direct or regulate. Keeping this in mind, let's consider each of the four factors above as it pertains to managing maintenance in the Navy.

I — The Monster

Maintenance management is relatively young in the Navy, having received its first big push in the early '50s. As any science or art grows and matures, it tends to become more and more complex. Many different people contribute to its growth and development, and consequently the principles, procedures and techniques multiply rapidly. Each contributor has his own ideas; eventually the field activity maintenance manager is perplexed and confused. He has become so buried in paper work that he is overwhelmed by it.



II — The Machine Age

By *machine age*, I mean the basic trend to rely more and more on technology for the solution of maintenance management problems. We expect the computers to do our work for us. Let's not forget that the first syllable of management is *man*. Computer readouts and/or IBM reports can only *assist* us to manage; they do not manage for us. However, more and more, the trend is to depend on bigger and better computers to put out bigger and better reports which mean absolutely nothing to most of us, and which control our maintenance not one iota.

The next question is "What can we do to eliminate, reduce or consolidate these four factors in order to streamline our maintenance management program in an effort to save the taxpayer (you and I) some money?"

At first glance there appears to be several things we can do, such as: reducing the "paper mill"; organizing for efficiency; and managing properly

As I stated before — maintenance and maintenance controls cannot be standardized at the many varied naval activities. This is a rather drastic statement, but it is one that has concerned me for quite some time. Having worked in maintenance control for the Navy, (both as an officer and a civilian), as a maintenance management consultant and in private industries' maintenance programs, I am firmly convinced that maintenance management depends solely on the background, knowledge and ability of personnel running the maintenance program. We can write instruction after instruction; manual after manual; receive, prepare, and submit report after report; but unless there are capable people in the maintenance organization these things mean absolutely nothing. Standards are fine but they should be used only as guides or as new and possibly better ideas to be established, and *not* as the absolute law which *everyone* should be forced to adhere to. Let's look at the three proposed alternatives individually.

Reducing Paper Mill

The paper work generated at many Navy activities sometimes becomes so routine as to become boring and bothersome; as a result, much of it is meaningless. Each activity (or type of activity) should be able to develop and establish its own control methods, from which comparison and the effectiveness of the maintenance program can be measured. These methods can be approved by the management bureau, if desired, but the bureau should not attempt to dictate them. The important thing is that once a suitable measurement unit has been established, it should be used on the same basis each month so that a fair comparison can be made and a good determination of the effectiveness can be obtained.

It has been my experience that there are three basic

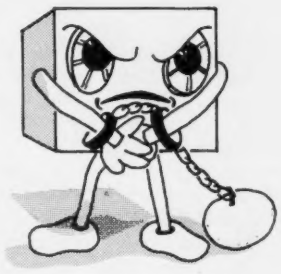
or Beast In
ENANCE
EMENT?

By WILLIAM C. HALL, P.E.
Head, Engineering and Facilities Planning Branch
Naval Ship Research and Development Center

III — The Monotony

Maintenance, just by the nature of the beast, is monotonous work. Because of this, it tends to become boring to a manager and, consequently, he tends to lose interest or direct his attention to other more exciting or lucrative work.

Variety is the spice of life — so the saying goes. Why not add some spice to the maintenance program? Let the shops do some alterations and improvement-type work occasionally. Let them have the feeling that they are accomplishing something.



IV — The Manacle

By their insisting on certain management reports, procedures and techniques, our hands are pretty well tied by the policies handed down by NAVFAC, the field divisions, and management bureaus and sponsors. No one can standardize maintenance nor maintenance control. Each activity should be given enough latitude to develop its own standards, procedures, reports, etc., with final approval resting with the management bureau.

areas common to most Naval activities in their public works department or maintenance functions and to which measurement can be applied. These areas are: planning, work load, and cost.

Planning includes all the control activities preceding the work and is basically an administrative function. Are planning and estimating necessary? Yes. It is definitely desirable to have a work request system which can serve as a record of work accomplished, if nothing else. Most P and E and maintenance control divisions appear to be overstaffed, however, and are encumbered by the Engineering Performance Standards (EPS), Universal Maintenance Standards (UMS) or other type standards. These are fine, and I feel every P and E should know how to use them and how they were derived, but they are very cumbersome and time-consuming for most types of work done by the maintenance shops. Again we're back to the personnel involved. A good P and E can do a better job of planning and estimating the work to be accomplished without the use of EPS, etc. (Incidentally, most of the EPS manuals have not been kept up to date with the latest methods, machines nor materials, so they are out-dated and virtually useless.)

With the number of maintenance people available, only so much work can be accomplished within a year. Based on the total mandays of work that a P & E group can produce per day (and this varies greatly with the individual P & E and the type of work being estimated), the P & E staff size should be related to maintenance staff number. It should not be staffed to take care of anticipated sick or annual leave. During these periods, if necessary, someone should be brought up from the shops to perform the work. What better way than this to train for the future P and E staff.

Units that can be used in measuring the effectiveness of planning and estimating functions are:

(1) Percentage of emergency work (total man hours)
(2) Overtime work — percent — (overtime hours vs. total hours)
(3) Labor effectiveness — % time working — by work sampling
(4) Man hours of planned and scheduled work per month

Work Load includes everything covering the actual work

Man or Beast

Continued from preceding page

load in the shops and how it is executed. Again, the work accomplished is directly proportional to the personnel involved — particularly the shop supervisors. Most shop supervisors I have seen are not properly indoctrinated into the "big picture". They are not cost-conscious. A typical example is when a man is sent out to repair a drinking fountain. He knows that the fountain is beyond economical repair and so indicates on the work request. Yet he will charge 2 or 3 hours to a repair which will require further repair in a week or two rather than spend that 2 hours replacing the fountain. I have seen many such examples — from doors and windows to motors.

Measuring units for work load includes such items as:

(1) Shop days of current backlog (work in shops)
(2) Estimated shop days of backlog of work not issued
(3) Percentage of total man hours per week for maintenance work
(4) Percentage of total man hours per month for operator maintenance and preventive maintenance
(5) Percentage of total man hours per month for non-maintenance type work (i.e., construction, relocations, etc.)

Cost includes the various items that indicate trends in the cost. It indicates how much it is costing the maintenance division to handle the planning, control the work load, and provide necessary services to the plant. There are many units that can be used to measure the cost. Some of these are:

(1) Maintenance cost as percentage of fixed assets. Fixed assets includes buildings, equipment and facilities, but does not include land. Actual or replacement cost can be used as long as you are consistent.
(2) Percent increase or decrease in maintenance cost per 1000 sq. ft. (or other appropriate unit — acres, lineal feet, etc.). Use a base period of average of preceding two years. The maintenance cost must be adjusted by the maintenance index to the base period for changes in labor and material prices.
(3) Maintenance cost per Kilowatt-hour.

How about all those reports we prepare for the field division, NAVFAC, and/or our management bureau? Have you really tried to find out how many are really used and serve a truly useful purpose? Try it! Ask yourself what you would do with a particular report if you were at a higher level. Or better yet, stop submitting a routine report and see how long it takes before you are questioned about it. Think of the time that could be put to use *managing* if you did not have to submit certain reports.

In the years that I have been in my present position, we have cut the number of people in our branch from 21 to 14 — a 33% reduction. Some of these were by attrition, transfers, forced retirements, etc., but the important thing is that when they left we took a long hard look to see if their functions could be performed elsewhere. In most cases, they could. Our service organization has roughly 200 shop workers including a very large machine shop doing industrial type work (all planned and estimated). We have four P & E's (machinist, electrical, structural and pipefitting). When we lost 3 of our 4 inspectors (who did both contract and continuous inspection), we assigned continuous inspection to the P & E's. A simple form is used for reporting discrepancies. This form also provides most of the information for the annual inspection summary.

We have combined the functions of maintenance control director and engineering branch manager into one position. This provides much better coordination among contract and shop work and better overall control of priority type work.

We have only one girl in our branch who serves as my secretary, E/S clerk, budget clerk, telephone clerk and clerk for P & E's, inspectors and engineers.

Work load has remained fairly constant and we still get out the job orders and contracts without any major problems. Other areas of normal public works departments can also be combined with more efficiency.

Managing Properly

Managing consists basically of the following:

(1) Keeping informed as to what is going on in your branch, department, division or activity.
(2) Developing plans based on this information which give direction toward your progress.
(3) Guiding actions of others so that the planned goals are achieved.
(4) Follow up to see that things are going as planned — back to step 1 again.

We cannot continue to do something because we've always done it in the past. The good old days are gone. Nor can we look ahead and hope that things will change and all our problems will be solved. We are living in the present. We must be realistic.

As Dr. E. Stanley Jones, a great religious leader, once philosophized: "The reason why so many old people live in the past is that they have ceased to be creative in the present. So they turn to reminiscing as mental compensation for lack of creative activity now. The old person who is creative does not turn to the past except for reference, for he belongs to the present and the future. The man who is driving a car looks into the mirror to see what is behind while he forges ahead. So we must look into the past as in a mirror while we forge ahead into the present and the future. To glance at the past to learn its lessons is wisdom; to gaze at the past and to try to live in it is folly . . .

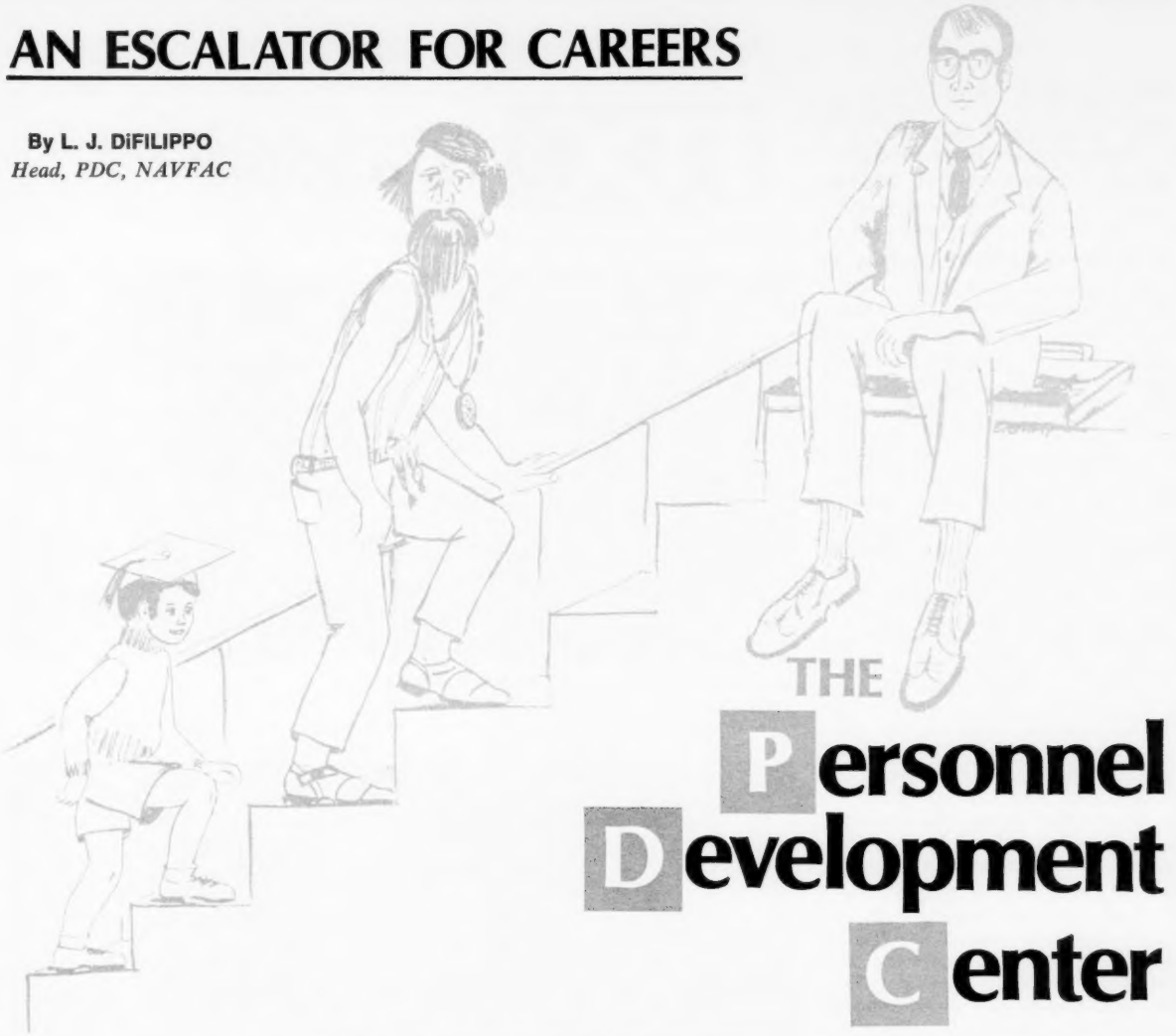
"The opposite of a flight into the past is a flight into the future. Perhaps there is no past to boast over and the present is frustrated, then many fly into the future and try to live there as mental compensation for not being able to produce the goods in the present. They are the grandiose dreamers who are always going to — they never do. They are the impractical dreamers who don't touch the present for they are too busy with the future. The present is messy — the future is glorious, so they try to live in it. They live in the never-never land of projected dreams. They have no roots in the present, so they bring forth no fruits in the present — they are parasites on the present as they live in the future. But the flight from today and its problems brings its nemesis — the dreamers about tomorrow who do nothing about today invariably live in a tangled today, for they have increased its tangles."

This, I believe, is very appropriate for us managers. Yesterday is history, tomorrow a dream, today reality.

We should all be managing properly — now — today. Let's help stamp out the monster, the machine age, the monotony and the manacle from maintenance management. Let's put the *man* back in management.

AN ESCALATOR FOR CAREERS

By L. J. DiFILIPPO
Head, PDC, NAVFAC



THE Personnel Development Center

• Alexandria, Va.

The Professional Development Center (PDC) was established in 1964 as part of the then Bureau Career Plan for civilian professional personnel. The program's purpose is to hire junior professionals who, through planned development and intensive on-the-job training, could be advanced to meet intermediate and long-range goals of the command in replacing losses of its professional staff. PDC personnel are hired on the basis of command needs projected two to three years in the future.

The concept of operating trainee pools is not new to the Navy. Many systems commands have had, and continue to have, pools of young professionals who are trained and developed in a variety of disciplines. NAVFAC recognized the need for such a program in the late 1950s. Hiring and developing recent college graduates utilizing local resources has been carried on by command activities for many years. With fluctuating resources, many of these young talents were lost before they were phased into the fully-qualified work force. In mid-1964, the command established the NAVFAC PDC as we know it today.

Associates enter as the GS-5 or GS-7 level, primarily in the engineering, architectural, housing management, real estate management and contract administration areas. These personnel are evaluated very closely on their performance in the functional areas to which they are assigned. Supervisors submit these evaluations quarterly for review by the head of PDC at NAVFAC, along with recommendations regarding promotions, retention and final placement. The trainee also prepares a narrative evaluation of training assignments monthly during the first year and quarterly thereafter.

During the center's first eleven years of operation, 579 trainees have advanced into journeyman positions within the command. On 30 June of this year 74% of these former associates were still holding positions in NAVFAC or one of its field organizations.

The PDC maintains an average of 165 on board at any given time. The current on board group is being utilized in headquarters, every Engineering field division, five public works centers, Naval Construction Battalion Center Port Hueneme, Officer in Charge of Construction (OICC) Thailand and (OICC) Trident.

A female and minority participation totaling 32% reflects command interest with regard to the NAVFAC Affirmative Action plan. Representation lies in the following areas: Females, Blacks, Spanish, Asians and American Indian.

A PDC steering committee, consisting of representatives from major program areas at headquarters, estab-

Continued from preceding page

lishes annual intake priorities based on requirements and resources made available by the Command Advisory Board (CAB). Personnel and financial management support are provided by the Chesapeake Division. College recruitment is conducted by the Capital Area Personnel Services Office-Navy (CAPSO-N), whose team of trained recruiters make approximately 300 visits to 200 colleges and universities during a scholastic year. Applications from CAPSO-N and other sources are screened at headquarters PDC for geographic preference, quality of education and command needs. Selected applications are forwarded to regional offices of the Civil Service Commission for certification under competitive requirements. Upon acceptance of the offer and subsequent reporting to a command activity, the training and development, mobility and final placement aspects of the associate's program are administered through the center at Headquarters NAVFAC.

Individual plans are prepared for each trainee upon arrival at an assigned activity. These plans outline the assignments the individual will undertake during the total development period. Emphasis is given to ensure rotational assignments through all programs that have a day-to-day impact on the areas projected for the trial and final assignment phase of training. This assignment is normally the last six month training phase and usually takes place at the activity which requested the PDC billet. It is used to evalute the associate's ability to assume the duties of an established position normally at the GS-11 level. Satisfactory completion of this assignment results in transfer from the rolls of the PDC to the rolls of the acquiring activity.

The Professional Development Center is operating in a highly competitive situation. As the technology in the engineering fields expands, the demand for young professionals will continue to increase. Competition will mount for the best qualified candidates between private industry and various agencies of the federal government. Keeping in mind the interest of NAVFAC, the indication is that the PDC is definitely achieving its goal within the command. An experienced professional staff is being continued through organized recruitment and training. Such staff will transmit the reservoirs of knowledge and experience into the future for the command.

PDC at a glance...

LOCATION BY ACTIVITY

30 June 74

*Headquarters — 23
*Engineering Field Division — 99
Chesapeake Division — 24
Northern Division — 11
Atlantic Division — 17
Southern Division — 9
Western Division — 33
Pacific Division — 5
*Construction Battalion Centers — 14
Port Hueneme — 14
*Navy Public Work Centers — 14
Norfolk — 6
Pensacola — 2
Great Lakes — 1
San Diego — 3
Yokosuka — 2
*OICC Thailand — 3
*OICC Trident — 1

Total — 154

As of 30 June 1974, 154 junior professionals were on the rolls of the PDC. Of this figure 76% were in the architect/engineer disciplines, with the remaining 24% serving in various non-technical positions utlzed by the PDC.

RETENTION

FY 64 — FY 72

Associates Placed — 443	
Still with Command — 306 (69%)	
Headquarters	76
Chesapeake	57
Northern Division	38
Atlantic Division	40
Southern Division	26
Western Division	59
Pacific Division	8
PWC Great Lakes	1
PWC Newport	1
Total	306

PDC personnel retention in the center's first nine years of operation. FY 73 & FY 74 have not been included because of their statistical insignificance. (90% of former trainees placed within the last two years are still with the Command).

FY 73 — 74

Associates Placed	136
Still with Command	122
Compilation FY 64 — 74	
Hires	822
On Board 6/30/74	154
Sub Total	668
Losses During Training	89
Placed in Command	579
Remain in Command	428

Composite of the Center's first eleven years of operation. Hires totaled 822, including the 154 in the PDC on 30 June 74. Of the 89 losses recorded during training, 10 are presently in the military with return rights to the program. The center placed 579 trainees into permanent positions throughout the command. The results of a recent survey indicated that 428 former trainees are still in positions with NAVFAC, resulting in an overall retention rate of 74%.

MINORITY PARTICIPATION

Minorities	Engineer/Architect	Management
Blacks	11 (1 Female)	6 (1 Female)
Asians	12	1
Spanish	4 (1 Female)	—
American Indians	1	—
	28	7
FEMALES	8	7
Sub Totals	36	14
	Total — 50	

A 32% female and minority participation reflects Command interest with regard to the NAVFAC Affirmative Action Plan.

Reroofing with urethane

By ROBERT A. RIVERS, CE and
WILLIAM C. HALL, PE
Engineering and Facilities Planning Branch
Naval Ship Research and Development Center

• Annapolis, Md.

With the recent interest in the application of foamed polyurethane to roofing, the experience of the authors in this technique at the Annapolis laboratory of the Naval Ship Research and Development Center, may prove of value to other public works personnel.

We have had two contracts for the application of this type of roofing. The first project, completed in May 1971, consisted of reroofing one building — a pre-engineered structure constructed in 1946 with an annex added in 1968. The building, used as a laboratory, is fully air-conditioned and partitioned. The original 26 gauge 4:12 slope ribbed metal roofing, standard with the manufacturer, had been covered with rigid insulation board, 1 inch thick, plus a three-layer mopped-on asphalt felt roofing, sometime in the early 1960s. In 1970, when leaks became excessive, roof replacement was considered; but the interference with laboratory work plus the high cost of removal, replacement and re-insulation led us to investigate other means of reroofing, such as urethane. Manufacturer data became the deciding factor in awarding an informal contract to repair this roof. For obvious reasons we proceeded very cautiously and benefitted from the advice of one installer who visited the site and who eventually became the successful bidder. We were well aware of previous major failures of the urethane roofing business. It is understood that aging was the problem. In order to get the laboratory to try this new roofing, the contractor agreed to accomplish it at an informal contract price ($1990). The roof of the building was 53 squares, resulting in a unit cost of about $.39.

This reroofing contract called for a prime coat — ½ inch thick foam and a protective coating of asphaltic aluminum paint sprayed on. The contract was awarded in late 1970 but, because of unfavorable weather, the work was postponed until the spring of 1971. During the work, the existing asphalt felt layers were found to be soaked completely through in various areas, so the contractor provided metal vents about 12" x 12" in susceptible areas. The complete work was done quickly, although the wind did cause some excess foaming in some areas of the roof. The work was accepted in May 1971.

The second contract also was accomplished by the same firm and completed in the spring of 1972. This contract was for three buildings — two very similiar to the first building — one of 57 squares and one 45 squares. The third building of 33 squares had a 90% slope corrugated metal roofing within a high parapet. One of the buildings had a 12 square flat roof addition.

In 1971, many leaks had been reported in all three buildings. The conventional approach of replacing these roofs was again considered and rejected. Consequently, we again considered urethane as the most efficient and economical way to provide the necessary corrections, and again inquiries were made to various manufacturers. Particular attention was also given to NAVFAC Notice 4121 of 16 September 1971. In view of the generally favorable results obtained on the previous contract, and the reputation of the manufacturers engaged in promoting urethane for reroofing, it was decided to go ahead with the repairs, using urethane. The contract was awarded in April 1972.

The specifications for this contract required one inch of foam instead of ½ inch; and the type of coating was made optional (urethane, neoprene or hypalon) in lieu of the asphaltic aluminum previously used. The contractor used a different brand of urethane for the foam and the protective coating was applied in two coats — the first gray and the second white. Again, sheet metal roof vents were provided on the two steel buildings. The total contract was for $8,776, averaging out to $.61, which also covered some incidental gutter and other work.

The work was done during May 1972 under generally favorable weather conditions, although some winds to 8 mph did create problems with the urethane foam on one building, necessitating the cutting off of "blisters" and "boils" and refoaming. Representatives were on board from the National Bureau of Standards and the manufacturers. Samples of the urethane foam and the protective coating were given to the representative from the National Bureau of Standards.

The completed job was accepted in May 1972. Later that year, examination of the roofs during visits by personnel from other government agencies (NBS, US Marine Corps, US Coast Guard, US Navy) revealed a multitude of pinholes in the protective coating and a few small areas of saturated urethane. The contractor was notified and it was mutually agreed to await spring for corrective action. Very little snow fell during the winter and the same conditions were reported in March 1973. In late May 1973 a meeting between Navy and the foam manufacturer's representatives was held, at which time it was observed that very few of the "soaked" or "saturated" foam areas existed and the "pinholes" in the coating were less frequent and smaller in size. Minor repairs, using aerosol equipment, were made by the contractor under the warranty provision of the contract. To date no leaks have occurred on any of the roofs that have been reroofed with the urethane foam.

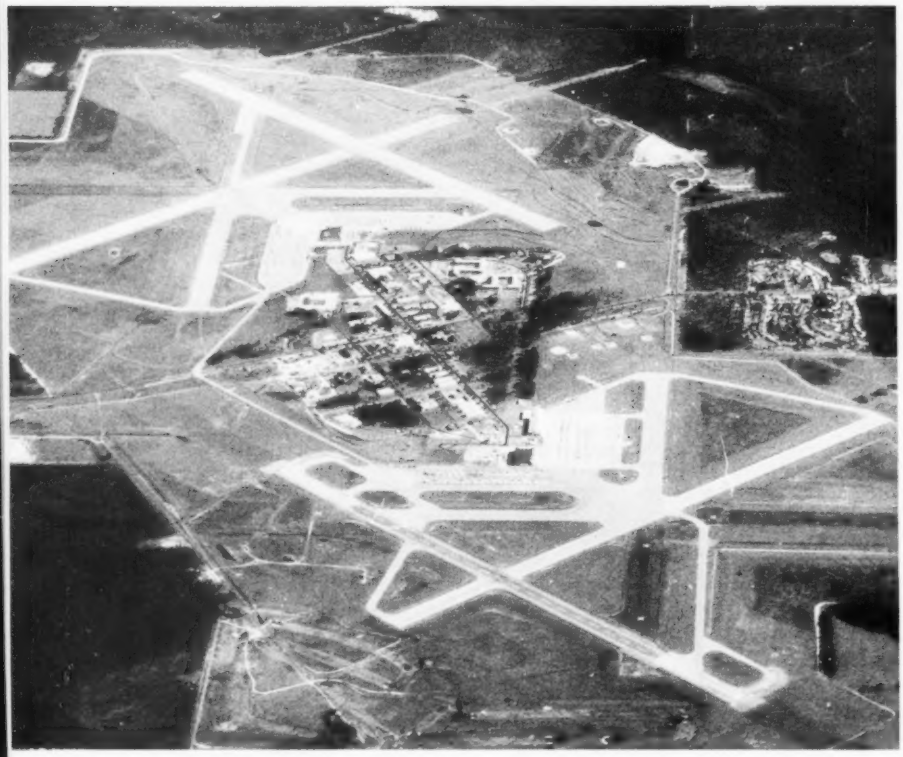
Increasing interest in polyurethane roof coatings has resulted in many articles in recent months. The report, #10963 of the National Bureau of Standards entitled "Guidelines for the Selection and Use of Foam Polyurethane Roofing Systems" which was dated 18 Dec 1972 is probably the most detailed, accurate, and informative source of information available to date on this type of work.

It is much too early to give a definite evaluation of urethane for roof repairs but to date it has proved to be an efficient and economical way of repairing roofs, particularly for unusual shaped roofs. An additional advantage is that it also provides excellent insulation qualities.

Recent discussion with the contractor involved in the above jobs indicate poor results with urethane on flat roofs. He also recommended at least 1 inch of urethane and even thicker where greater insulation is required. It is generally agreed that the asphaltic aluminum coating is just as good as the other types (hypalon, neoprene, etc.) and costs about half as much ($.10 vs. $.20 in place).

At Whiting Field, Florida

Two Airfields For The Price



NORTHERN APPROACH — Pilot's view of Whiting Field shows modified and improved operational areas for helicopters (upper left center) at South Field with fixed wing aircraft training at North Field (lower right).

• Milton, Florida

In December 1973, Helicopter Training Squadrons 8 and 18 transferred from NAS Ellyson Field to NAS Whiting Field at Milton, and the single basing of helicopter flight training at Whiting Field was realized after more than two years of planning.

Since the forming of the Naval Training Command (now the Naval Education and Training Command) in Pensacola in 1971, a major goal of Vice Admiral Malcolm W. Cagle has been the single basing of all Navy flight training. Simply put, this means that a student pilot undergoes basic and advanced flight training and receives his wings at one base. This eliminates travel expenses, lost time, refresher training and administrative and other expenses incurred when basic and advanced training are accomplished at separate bases.

Implementing the single basing concept at Whiting Field required extensive logistics support. The Navy's logistic support requirements system "is designed to identify all tasks, functions and workload to be accomplished by a shore activity over a period of eight years" requiring "major policy decisions . . . by each echelon of command". Realistically, an organization responding to political, budetary and changing national security requirements cannot tie itself *en toto* to an eight year planning cycle.

In the case of Whiting Field, logistics planning for the new mission was accomplished locally at the "grassroots" level and later approved and funded through the chain of command. A period of only 28 months elapsed from the start of conceptual planning to the actual arrival of the helicopter squadrons, and much of this was devoted to preliminary planning. By comparison, the optimum military construction cycle is about four years.

Prior to the transfer of helicopter training, Whiting Field supported the Commander, Training Air Wing 5 and three squadrons for basic training in the T-28 propeller aircraft. Training Squadrons 2 and 6 at North Whiting Field provided basic training for helicopter students, and Training Squadron 3 at South Whiting Field provided basic training for students going into the fixed wing propeller pipeline, with advanced training being accomplished at Corpus Christi, Texas.

"Two airfields for the price of one" has long been the motto of Commander, Training Air Wing 5, and the two airfields at Whiting made it the ideal site for single basing helicopter flight training. When the subject of single basing was first advanced, it was assumed that basic training for the prop trainees would be transferred to Corpus Christi, allowing the two helicopter squadrons and approximately 100 aircraft to move into South Whiting Field. However, physical limitations at Corpus Christi precluded the transfer of an entire fixed wing squadron. So, it was decided that about half of VT-3's personnel and aircraft would be transferred to Corpus Christi, with North Whiting Field accommodating the remainder — a total of three basic prop squadrons and 156 aircraft.

The big question that remained was how to provide sufficient facilities at Whiting to support the new mission. At North Whiting Field, facilities were required to house a third propeller squadron. At South Whiting Field, concrete pads were required for parking of approximately 100 helicopters. Existing fuel pits on the parking aprons were considered hazardous to helicopter operations. Jet fuel facilities were required for the helicopters, whereas the assigned T-28 aircraft used aviation gasoline. Finally, additional funding and personnel were

Of One!

By LCDR A. E. SMITH, CEC, USN

IN ONE PICTURE — The results of Whiting Field's modification at the southern training area: a hovering H-57 (top) another refueling (left center) while the third (far right) prepares for takeoff. Light areas are new helipads.

required in order to move and support the new mission.

A fortunate set of circumstances combined to render easy solutions to most of these problems.

A new flight training and briefing facility at North field was under construction for VT-2 and VT-6. Existing facilities occupied by the squadrons, including an old two-story brick building, were planned for demolition. Authority was received to retain the brick building and partially remodel it for VT-3 administration and training functions. An existing hangar at North field contained excess bay space which, when coupled with consolidation and relocation of certain functions, could accommodate VT-3 maintenance requirements. Also, there was space available in another hangar facility occupied by the crash crew to absorb the overflow of the displaced functions.

Two jet fuel tanks with a total capacity of 400,000 gallons had been constructed at Whiting Field in 1961 and later inactivated. A double avgas truck fill stand was already in place. Considerable repairs and alterations to the existing tanks, valves and piping were required, however, to meet current JP4 fuel criteria. An FY72 MCON project for airfield improvements included filling the fuel trenches at South field and providing new structural trench covers meeting pavement loading criteria. Since the existing avgas (pit) refueling system was antiquated and would not be used to refuel helicopters, the decision was made to abandon and remove the existing system, including the pits, in lieu of filling the trenches and installing structural covers.

In order to support the change in mission, the necessary projects and facilities modifications were developed locally. Fifteen special projects (construction, repair and equipment installation) and one urgent minor construction project were submitted, all originally estimated to cost in the neighborhood of $800,000. The total cost of the move, including personnel, O&MN expenses and some long range MCON work, was estimated at $3.2 million. However, a net annual savings of $1.5 million was forecast due to the consolidation of Whiting Field and Ellyson Field flight operations and support missions.

Local planning began in September 1971 and a formal proposal for the move was advanced jointly by the commanding officers of Whiting Field and Ellyson Field in December. This proposal was later modified to retain VT-3 at North Whiting Field. The plan was favorably endorsed by the Chief of Naval Air Training in June 1972 with an estimated nine month timeframe for facilities design and construction.

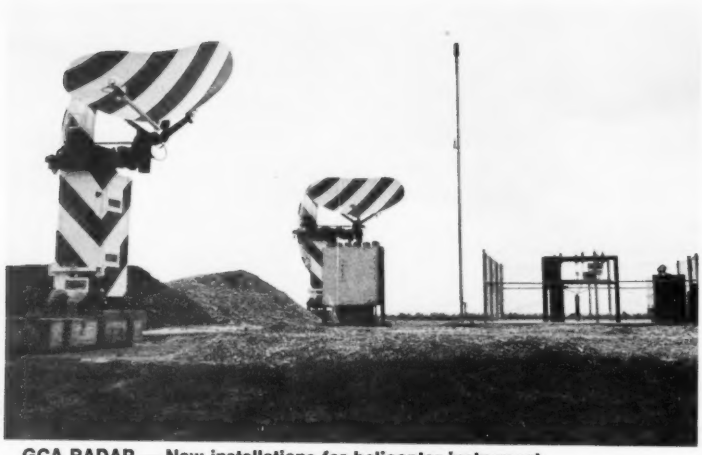
The special projects and urgent minor construction project were submitted for approval and funding in July. CNO approved the conceptual plan in August, subject to SECNAV approval and identification of funding. However, the uncertainties of funding, politics and the entire spectrum of base realignments delayed final approval action. Design authorization for special projects was received in March 1973 and design was accomplished in 60 days. Design reviews were conducted in the architect's office for the sake of expediency. The special projects were advertised in three construction contract packages. Contracts were awarded in late June 1973, with completion dates for the majority of the work in December.

The road was not so smooth, however, for the urgent minor construction project; DOD withheld its approval pending a review of the entire Shore Establishment Realignment program. Although design commenced in March, authority to advertise was not received until late June; a contract was awarded in August with a December completion date.

Numerous problems arose during construction, including a steel shortage which threatened to delay completion of work on the fuel systems by several months; inclement weather and a shortage of diesel fuel which threatened to delay completion of work on the

Continued on next page

TO FEED THE CHOPPERS — New storage tanks for JP-4 fuel (below) featuring fixed and floating roof structures are now operating at Whiting's South Field.



GCA RADAR — New installations for helicopter instrument training have been installed in South Field — another aspect of the parent field's general modification to serve two purposes.

HELIPADS — New concrete pads were required to be constructed at South Field to accommodate the area's new helicopter training requirements.

OFF AND AWAY — Helicopters and their crews are now a familiar sight at Whiting Field's 'other field' a result of the general modification program.

Two Airfields For The Price Of One!

Continued from preceding page

parking aprons; delays due to the large volume of electrical work and limited manpower availability; and delays in receipt of numerous construction materials.

In many cases, work had to be accomplished in occupied spaces or in a pre-determined sequence in order not to interfere with operations. All work was closely monitored by ROICC and station personnel. Completion of work in the avionics shop of the aircraft maintenance department became a joint contractor, public works and military effort. The public works shops provided assistance with many details neglected in design, and several contract change orders were also necessary.

Construction, repair and equipment installation costs were closely monitored by facility category code to insure that statutory limitations were not exceeded.

Based on the original contract completion dates, the physical move of the squadrons was scheduled over the Christmas-New Year holiday leave period when training flights are normally suspended. The commanding officer and wing commander were kept informed through weekly status reports on the progress of all work. In this way, major problem areas were identified and resolved as quickly as possible and potential delays were recognized in advance. There were no last minute "surprises".

Responsive expediting action by ROICC Pensacola, yielded a special steel allocation, and various critical construction materials were obtained. As December approached, the pieces of the puzzle began to fit into place. The new spaces to be occupied by VT-3 were rapidly taking shape. The fuels system was the first major contract to be completed, despite some last minute concern over the operation of the transfer pumps and controls which had been inactive for six years.

The major source of concern in December was weather, as work on the helicopter parking aprons at South field was behind schedule and any significant weather delay would have postponed the move. It was at this time that the contractor had difficulty in obtaining diesel fuel and requested a special allocation which became bogged down in bureaucracy. ROICC

Pensacola took action to obtain the fuel allocation and the contractor made a concentrated effort to complete the job, taking maximum advantage of good weather until he was "out of the woods".

The final cost of the facilities work, not including some operational refinements and future MCON for outlying field support, was approximately $1,200,000 as compared with the original "ballpark" estimate of $800,000.

In retrospect, it was a job well done, but some lessons were learned as well. With the lead time available for preliminary planning, staffing and decision making, design should have been approved earlier and more time allocated for the preparation of plans and specifications. A more detailed on-site design review should have been allowed at the activity level where obvious omissions could have been identified by a walk-through inspection of the facilities. New occupants of the altered facilities should have been interviewed more closely and pressed to provide graphically to the planners a layout of their work spaces and utilities requirements. This was particularly true at South field where the helicopter squadrons moved into maintenance and administrative spaces formerly occupied by a fixed wing squadron. Although their personnel made several inspections of the spaces in question and certified as to their acceptability to meet operational requirements, the deluge of work requests received after the move proved them wrong. Most of this work could have been accomplished by contract, relieving the public works department of an unnecessary burden.

Better operational planning with respect to outlying field support was also needed. Although new fields are programmed for FY74 MCON, immediate operational realignments were necessary to avoid long transit times and attendant excessive training times and fuel consumption. Had more thought been given to this and more timely decisions been made, the facilities requirements at the outlying fields could have been identified and provided for prior to the move.

But, in spite of the lessons learned, overall grassroots level planning on a short time fuse was highly effective and is providing an early monetary return on a modest investment to the Naval Air Training Command. The key to the success of this mission realignment was a flexible and responsive facilities planning effort to support operational requirements.

NOTES and EDITOR'S COMMENTS

EXPERIENCED ENGINEERS, as do editors, know that anything that *can* happen to a project — *will*. Now, it's a librarian's turn. A friend of all of us, i.e., Mrs. Barbara Horn, librarian for CECOS, recently sent back issues of certain professional publications to a bindery to receive the buckram treatment and thence scheduled for the reference shelves. However, the bindery burned down — way down. Missing now from CECOS references are the following: all issues for 1972 of *The Engineering News Record*, plus the February 22, 1973 edition and the September 1971 edition of the *Armed Forces Journal*. The publishers are unable, as are other logical suppliers, to furnish the missing editions. Can you help madam librarian? If the copies are available please contact her by calling Autovon 360-5655 or commercially collect at (805) 982-3104. Thank you.

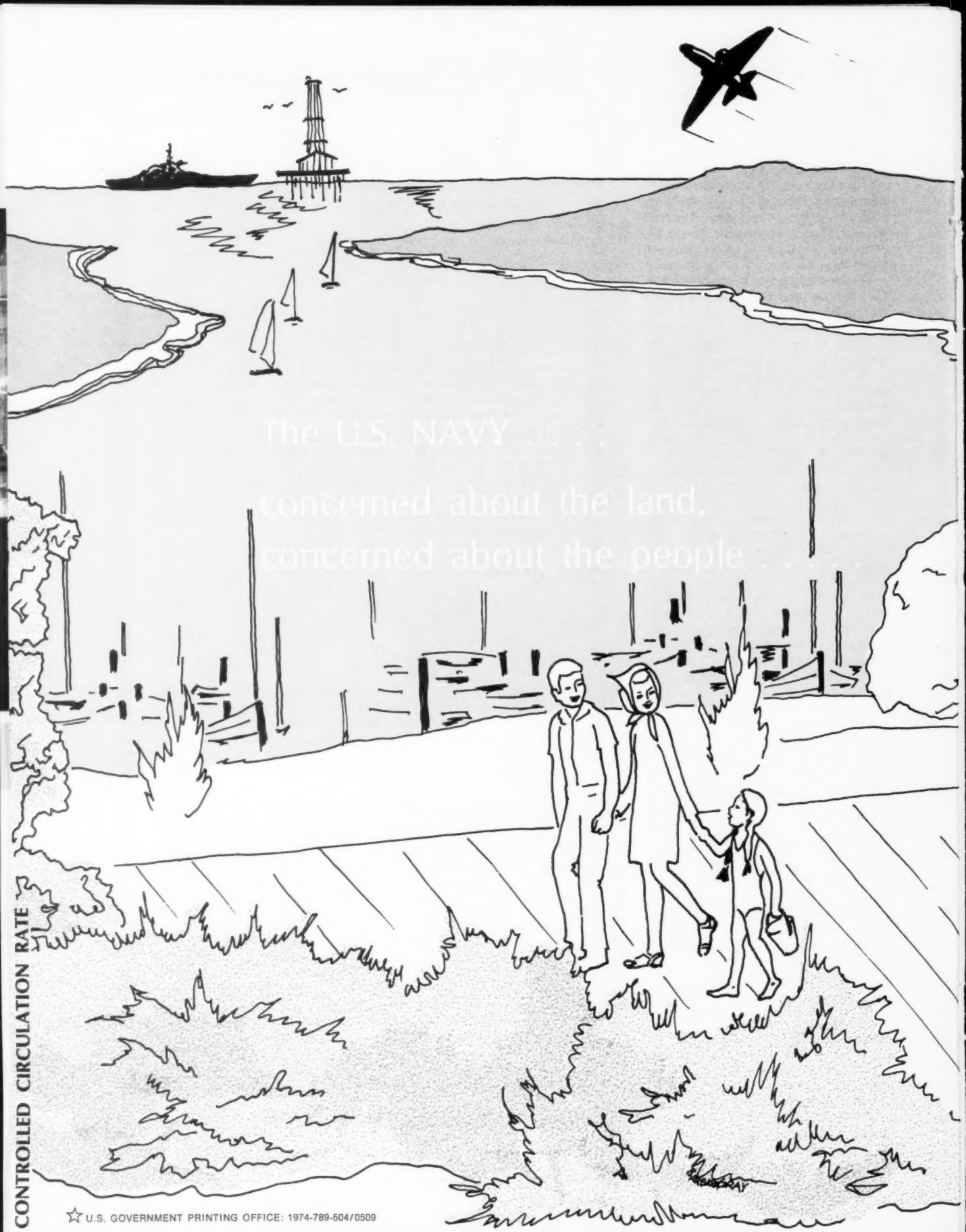
E7s-E8s-E9s, otherwise known as chief petty officers, senior chief petty officers and master chief petty officers, are now personally receiving *The Navy Civil Engineer*, as well they should be, being the military middle-management group. We trust these valued non-commissioned officers become *contributors* to these pages, as well as readers. After all, isn't it written that a Seabee chief invented the wheel?

MIDDLE MANAGEMENT, on the civilian side of the NAVFAC/CEC/SEABEE conglomerate, together with non-military recipients of this publication, will receive within the next few weeks a card requesting continuance or cancellation of the publication. The self-explanatory card *must* be returned by the date specified or the distribution will automatically be discontinued. In short, no tickee, no *NCE*. This advisory, of course, is *not applicable to paid subscribers.*

THIS EDITION'S story "A Mosque For Morocco" (page 34), relating an unusual assignment for a Civil Engineer Corps officer, has an interesting footnote. Following the author's presentation and plans, the then ambassador to Morocco, Stuart W. Rockwell, wrote to the Chief of Naval Operations "... I have seen the model which Commander Stewart has constructed in his spare time and am impressed by its beauty. News of Commander Stewart's work has been favorably received in Moroccan circles, and I wanted you to know of the commendable contribution which he has made to strengthen relations between our two countries". Certainly there are other similar and *untold* stories from the Corps. Message received?

THE NEXT EDITION will see the return of "Speaking From Topside", the longtime column of the Commander of the Naval Facilities Engineering Command and the Chief of Civil Engineers which had been temporarily discontinued. In reintroducing the column, Rear Admiral Marschall emphasizes his recognition of other "tops" and other "topsides", consequently succeeding editions of the Fall issue will feature remarks and opinions by other flag officers of the Civil Engineer Corps.

The next edition will also feature several articles concerning the Navy's energy conservation program, timed for the advent of winter, when fuel and electric consumption is at its highest. The Fall '74 edition will be themed to, but not limited to, ENERGY!



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